

PROCEEDINGS OF THE
AFRICAN CYBER CITIZENSHIP CONFERENCE
2014 (ACCC2014)

5-6 November 2014
Port Elizabeth
South Africa

Editor:

J.F. Van Niekerk

Publisher:

Nelson Mandela Metropolitan University
PO Box 77000
Port Elizabeth
6031

Proceedings published at
<http://accc2014.nmmu.ac.za>

ISBN: 978-1-920508-46-3

TO WHOM IT MAY CONCERN

The full papers for the African Cyber Citizenship Conference 2014 were refereed by a double-blind reviewing process according to South Africa's Department of Higher Education and Training (DHET) refereeing standards. Before accepting a paper, authors were to include the corrections as stated by the peer reviewers. Of the 23 full papers received, 13 were accepted for the Proceedings (acceptance rate: 57%).

Papers were reviewed according to the following criteria:

- Relevancy of the paper to the Cyber-based theme
- Originality and Innovativeness of the research
- Quality of Academic writing and Argument
- Appropriateness and Quality of Literature sources used

The program committee reflected the inter-disciplinary nature of the conference and consisted of international experts in the fields of Information Technology, Law, Psychology, Management, and Education.

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Technology, cyberspace, science fiction and being-human

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Abstract

This paper focuses on the link between cyberspace as a function of advanced technology, science fiction as traditionally a critique of science and technology, and the effects of advanced communications technology (including artificial intelligence and robotics) on being-human (that is, the distinctive condition of being a human among other beings, 'natural' or technological). It is by now well-known that we live in a so-called "network society" (Castells), and that the material basis for the communications network that exists globally comprises electronic networks of which the internet (and more broadly the world-wide, including the "deep" web) is the mainstay. What is less well known is that this revolutionary state of affairs, which was preceded by the development of computer technology and initiated by ARPANET before it became the internet, has had a steadily growing effect on the dominant sense of space and time that constitutes the human, or social world, manifesting itself, in Castells's terms, as "the space of flows" and "timeless time". This paper addresses these effects and relate them to the notion of cyberspace as elaborated in science fiction (particularly the work of William Gibson) as well as in the work of mainly Sherry Turkle, all of which raises the inescapable question: what does it mean to be human, and how do these recent events in the sphere of advanced technology affect that state of affairs?

Keywords

Being-human, Castells, communication, cyberspace, earth, ecology, information, internet, science fiction, Ranci re, robotics, space, time, Turkle, virtual reality

1. Introduction

What is cyberspace? Perhaps a good place to start is to ask where it comes from, or what the fictional, historical and material (technological) conditions of its provenance were. Some would raise their eyebrows at the suggestion that "fictional" factors could have played a role in its historical origin, but this possibility has been theorized by one of the most respected thinkers of the present, namely Jacques Ranci re – apart from which it is common knowledge that science fiction has preceded science and technology in imagining the occurrence of events and the invention of devices ahead of their eventual historical happening and appearance. Jules Verne, for instance, imagined humans landing on the moon long before it actually happened.

2. Fictional roots

What Ranci re (2010) has argued in his work would simultaneously help explain the prescience of science fiction. According to him the "aesthetic" function of artworks, including literature, is nothing like it was supposed to be by modernist conceptions of "aesthetic", namely to operate within the bounds of a distinctive "aesthetic" sphere, as distinguishable from an epistemic or scientific, and an ethical or political sphere, respectively. According to such a conception (Megill 1985: 2-4, 20-25; Habermas 1985: 9), art was something that functioned according to its own rules or logic, and it was unacceptable to extrapolate from there to the sphere of social reality, on which the other two domains had a purchase. Ranci re has turned such a modernist conception of art (and of politics), as something with its own realm of logic or rules, on its head, arguing that it ignores the extent to which the "aesthetic" (in the etymological, ancient Greek sense of "what belongs to the perceptible, sensible realm) pervades the social world by structuring it according to notions of power and interest. He articulates this insight by means of the phrase, "the distribution (or partition) of the sensible" (Ranci re 2010: location 499), which amounts to the claim that the arts do not merely embody inconsequential ways of "imagining" social reality, but that they instantiate ways of structuring this domain which do not remain, conveniently, relegated to innocuous representations. Instead, they are ways of actively transforming the social world by means of the different strata and configurations of distribution or partition that they carry out, and – this is the crucial part – which do

not remain within the hermetically sealed “walls” of the artwork, but gain a purchase on social reality itself, restructuring it in the process.

This goes hand-in-hand, according to Rancière (2011: 31), with a similar operation on the part of theoretical works (of which his own texts are an example) that explain the artworks in question: between these two kinds of texts, artistic and theoretical, the contours for the “(re)distribution of the sensible” are shaped. An example will clarify such a claim, and at the same time explain how science fiction participates anticipatorily in shaping the social world. William Gibson’s *Neuromancer* of 1984 (1995) and its two companion novels, *Count Zero* (2012) and *Mona Lisa Overdrive* (2011) was an imaginative projection – or in Rancière’s words, “distribution of the sensible” – of a future world where “cyberspace” (Gibson’s word), or the mode of space prevailing in the “matrix” was something one could enter, not merely via an avatar, as one can today, but in such a manner that your experiences were the same as those in ordinary social reality. Furthermore, if you died in the ordinary world, you need not have died in cyberspace, while inversely, if you died in cyberspace, you would die in the everyday world. Astonishingly, Gibson’s texts anticipated the world of today and of a not-yet-existing future. In Rancière’s terms, by “distributing the sensible” along the coordinates of a not yet existing, but possible world in his books, Gibson contributed to its historical emergence, while the complementary function of theory was carried out by texts such as Manuel Castells’s *The Rise of the Network Society* (1996; second edition 2010). Giving credence to Rancière’s thesis about art or literature participating in the “partitioning of the sensible” world, another theoretician, Sherry Turkle (1995: 42), has had this to say about Gibson’s work:

...in the course of the 1980s...[T]he aesthetic of simulation had become increasingly dominant in the culture at large. In 1984, William Gibson’s novel *Neuromancer* celebrated its approach to computing’s brave new worlds. *Neuromancer* was a cultural landmark. In the popular imagination it represented the satisfactions of navigating simulation space. Its futuristic hacker hero moved through a matrix that represented connections among social, commercial, and political institutions. *Neuromancer*’s hero yearned to fully inhabit, indeed to become one with, the digital forms of life. He was a virtuoso, a cowboy of information space, and thus for many a postmodern Everyman.

Gibson called that information space cyberspace, meaning the space that exists within a computer or matrix of computers. Cyberspace is not reducible to lines of code, bits of data, or electrical signals. On the face of it, Gibson’s matrix, or web of information, is not easily analogized to a Macintosh screen. But in the imagination of his readers, the similarities were apparent.

And three pages further she says (Turkle 1995: 45):

Prefigured by *Neuromancer*’s matrix of informational space, postmodernism’s objects now exist outside science fiction. They exist in the information and connections of the Internet and the World Wide Web, and in the windows, icons, and layers of personal computing...and in the simulations of the quantum world that are routinely used in introductory physics courses. All of these are life on the screen.

It should be noted, however, that Turkle’s own text (together with her earlier book, *The Second Self: Computers and the Human Spirit* of 1984) fulfils the correlative role that Rancière attributes to theoretical works, according to which the “distribution of the sensible” effected by art/literature finds its condition of intelligibility in the explanatory capacity of theory. Although it is by no means the only of its kind, this “sample” of literary fiction and its cognate theory/theories represents what one might call the “fictional” roots of cyberspace.

3. Historical and material roots

The historical and material or technological roots of cyberspace overlap with the fictional, but are distinct from it. One of the most encompassing and thoroughgoing, as well as detailed accounts in this regard is Manuel Castells’s monumental *The Rise of the Network Society* (1996), which also represents one of the explanatory theoretical texts that correlates with fiction like Gibson’s, and in the force-field between which the sensible world’s contours are re-configured (as Rancière has argued). It is not the only one of its kind (far from it; just think of Lyotard’s *The Postmodern Condition*, Harvey’s *The*

Condition of Postmodernity, Hardt and Negri's *Empire*, *Multitude* and *Commonwealth*, to mention but a few), but certainly among the most informative and reliable, as well as illuminating in interpretive-theoretical terms.

Castells's book maps the terrain that comprised the historical emergence of the most transformative power the world has seen in the last century, namely that of computer and communications technology. In sum (Castells 2010: Location 8859-9231),¹ he charts the transition from the culture-transforming role of television and video-technology, through the one-on-one use of computers to the development of ARPANET by the US military (which eventually formed the basis for the development of the internet) and the parallel development of Minitel in France to the eventual, fully-fledged establishment of the internet and the world-wide web (which overlaps with, but is not identical to the internet). He shows why Minitel, despite fulfilling its role of providing an efficient French network for citizen- and consumer-communication, in the end could not offer what the internet offered, namely flexible, indefinitely expandable and open-ended. He also clarifies the manner in which these technological innovations comprise the grounds for the globalization of neoliberal capitalist economies, as well as for the gradual modification of urban spaces, from centralized big cities with their surrounding suburbs to decentred metropolitan regions and areas comprising interconnected mega-cities with hitherto unheard-of population numbers. Succinctly stated, more graphically than any of the other theorists in this field, but no doubt building on the work of figures such as Lyotard (1984), Deleuze and Guattari (1983; 1987) Castells uncovers the astonishing degree to which what he has labelled the still expanding "network society" in all its many ramifications may be seen as a function of technological innovations stretching back to the middle of the 20th century, and gathering speed as the century waned.

The most far-reaching insight gleaned from Castells's work (2010: Location 653; 10334-10345; 10812-11516) pertains to space and time, however, and bears directly on the question of the meaning of "cyber-citizenship". His incisive analysis of the informational-technological transformation of global society since the last few decades of the 20th century disabuses one of the naïve belief that it is an innocuous change – a belief adhered to (surprisingly, one might think) by the vast majority of the world's population in societies with a large degree of access to the internet and other electronic means of communication, which are mostly ingenuously regarded in an instrumentalist way. The question of the widespread instrumentalist conception of technology invites a few observations before returning to the theme of space and time in Castells's "network society".

4. Technology and "Enframing"

Martin Heidegger (1977), one of the severest critics of the technocratic character of late modernity, already warned that it is delusional to believe in instrumentalist terms that modern technology amounts to a mere set of "tools". Instead, the "essence" of technology, or what Heidegger called "Gestell" ("Enframing") comprises a mindset or way of being-in-the-world, and of framing phenomena (including human beings) and events as being a "standing-reserve", or as having the nature of "resources" for use by humankind.² Whereas the medieval era, by contrast, was theocentric – understanding mundane things and events in relation to the fundamental assumption that a supreme being, God, created everything – the present era is technocentric, in so far as everything is fundamentally judged in relation to the centrality of "Enframing". This means that questions such as "What *should* we do in this situation?" (which emphasises the ethical) are systematically rearticulated in the form: "What *can* we do?" It is no longer a matter of probing the "ought"-character of actions required by problems or obstacles surrounding tasks framed in terms of (scientific and technological) "progress"; it has become a matter of determining their technical feasibility.³ (Compare the question regarding the ethical and constitutional status of

¹ I must stress that this brief summary cannot do justice to the breadth and depth of Castells's work, which must be studied in its own right. As an introduction that attempts to do justice to it at the level of summary as well as theoretical explication, see Olivier 2013.

² The fact that what used to be called the "Personnel Department" at companies and universities now goes by the name of "Human Resources" confirms Heidegger's insight.

³ It is interesting to note that the historical primacy of modern science and its offspring, industrial technology, has been reversed; while science's (specifically mathematically oriented physics') formulation of the relations between physical

the American NSA's ubiquitous surveillance of people's online activity worldwide, which is problematical, with its technical practicability, which appears to be unproblematical, except in the sense of technical perfectibility.) Furthermore, according to Heidegger *Enframing* constitutes an "assault" on the earth, instead of "letting it be" (*Gelassenheit*), arguably with dire consequences for the overarching planetary ecology of which humans and human economies are an integral part.⁴ Although his critique pertained to modern, largely industrial technology, it is a moot question whether it is equally valid in the case of information-technology, which seems to be even more pervasive than earlier stages of technological development as a way of framing social reality – something confirmed by the work of Sherry Turkle, as I shall presently show.

“Space of Flows”, “Timeless Time”, “Glacial Time” and Cyberspace

Returning to the issue of the transformation of space and time on the material basis of what Hardt and Negri (2001: 280-303) call the “informatization” of postmodern society as Castells describes it, it is noteworthy that the traditionally dominant sense of the “space of places” that has been familiar to all people since time immemorial has been relegated to a subordinate position by the encroachment of what Castells (2010: Location 10357-10368) calls “the space of flows”. The latter is a function of pervasive technological processes that have the character of “flows” – flows of information and communication, flows of capital investments and financial transactions, flows of immigration, of tourism and of fast road and air transportation, to mention only some. The point is that the newly dominant form of space – the “space of flows” – has been *produced* by the technological revolution. To be sure, it was always there, potentially, but only manifested itself in a limited fashion, in the extensive road network constructed in the Roman empire, or the railroad networks of the 19th century, for example. Today it has become hegemonic, with far-reaching consequences.

While most people still live in the “space of places” (in houses and apartments), this is subordinate in economic as well as political and cratological (power-related) terms to the “space of flows”: when George Soros shifts an investment of \$100 billion from one developing country to another, which happens in the “space of flows” of financial investments, it potentially affects the “space of places” in which ordinary people live in severely negative terms, for instance. Such transactions are performed quasi-instantaneously in cyberspace or virtual reality by means of gadgets such as laptops, tablets and smartphones – a realization that debunks the naïve impression, that using these devices is somehow innocuous.⁵ Moreover, every time one uses a mobile phone, or an iPad, or laptop, to access the internet, in other words, cyberspace, you are in the “space of flows”; every time you arrive at an airport building to catch a plane, you enter the “space of flows”. Some people, like very travel-intensive businessmen and -women, enter it when they fly, and remain in it at airport lounges and standardized hotels such as the Westin or the Hyatt all over the world – two of the spaces of the “elites” of the network society (Castells 2010: Location 10434-10445), exemplified by George Clooney's character in Jason Reitman's (2009)

objects proceeded in terms of calculability, it paved the way for technology's extension of this “knowledge” in the direction of technical control of natural objects, and more recently of human behaviour. See Heidegger 1977; Habermas 1971; Deleuze 1992.

⁴ A number of science-fictional novels and films have explored this lamentable state of affairs, which cannot be separated from technology, including John Hillcoat's cinematic adaptation (2009) of Cormac McCarthy's 2006 Pulitzer Prize-winning novel, *The Road*, and James Cameron's eco-political film, *Avatar* (2009), both of which lend themselves to an interpretation in Heideggerian terms. See Olivier 2010 and 2011a.

⁵ Not even interpersonal communication such as mobile phone conversations or texting is innocent; in light of the Edward Snowden event (see Olivier 2014a) anyone who thinks that it is, is simply ingenuous and uninformed (ironically!) The American television series, *House of Cards* (Willimon 2013 and 2014) is an apt Machiavellian demonstration of this fact – text exchanges between individuals can be a matter of life and death. See Olivier 2014.

paradigmatic “globalist” film, *Up in the Air*, who hardly ever stays in his own apartment, sojourning instead in these architecturally homogeneous hotels when he is not literally “in the air”.⁶

There is a more far-reaching planetary reason for the emergence of the “space of flows” not being innocuous, which has to be seen in conjunction with its temporal counterpart, or what Castells (2010: Location 10812-11516) has dubbed “timeless time”, as well as another form of time known as “glacial time”. Condensing brutally, it amounts to this: just as the “space of flows” has become dominant in temporal terms, the traditional notion of time as “sequential” and in (the now fading) industrial society as mechanistic (because of the regulation of time by clock measurement; Charles Chaplin’s *Modern Times* of the 1930s is paradigmatic in this regard) has made way for the newly dominant temporal mode of “timeless time”, the time-counterpart of the space of flows. The latter, according to Castells (2010: Location 10867-10890) continually approximates (although it could arguably never reach) the zero point in time at many levels. The most conspicuous of these are the quasi-instantaneous electronic transmission of communications and information, including not only e-mail, texting and satellite-aided telephonic contact globally, but round-the-clock investment shifts as well, and secondly the tendency in capitalist production processes to speed up production (“time is money”) to the nth degree. This process has all but replaced “slowness” as a way of living which prioritizes the quality of life, and goes hand in hand with the erosion of conversation among people in favour of texting and the like – something that Sherry Turkle focuses on in her book with the telling title of *Alone Together* (2010). These are not the only areas where “timeless time” manifests itself, however; it also surfaces in the (largely cosmetic) health industry, where the ideal of longevity (overcoming the effects of ageing) has led to unprecedented plastic surgery interventions, among other things. It should be noted that “timeless time” is a function of the “space of flows” (rather than *vice versa*); the more space is subjected to flows, the more it demands the overcoming of spaces of contiguity (or of places), and as this process is intensified, given the indissoluble connection between space and time, time itself contracts like a vector towards its own extreme diminution.

The upshot of these parallel, interconnected transformations of space and time is far-reaching: it entails nothing less than the erosion of what is known as the human “life-world” (Habermas 1987: 124), with its space of (contiguous) places and concomitantly, sequential time, although in an ambivalent manner. Ambivalent, because even as it erodes the “natural” life-world, it transforms it into what is arguably a novel life-world, one shot through with advanced electronic information-technology, and therefore one where the contours of a truly “communicative” life-world show signs of crumbling in the face of the increasing interposition of mediating devices like iPads and smartphones between interlocutors (more on this below). But it does not end there. I referred to “glacial time” earlier; this is the time-mode underpinning the work of the global environmental movement, that is, the time that eludes human measurements because of its “glacial” or geological-evolutionary scale, but which functions as an index of what happens to the earth, our only home (so far, despite all the imaginings of finding another “home” in interstellar space). The upshot of Castells’s judicious analysis of the current global situation is that an ominous chasm is opening up between the three modes of time – sequential, quotidian time, the “timeless time” engendered by the “space of flows” (including cyberspace), and “glacial time”. He puts it this way (Castells 2010: Location 11493-11504): ‘...the opposition between the management of glacial time and the search for timelessness anchors in contradictory positions in the social structure the environmentalist movement and the powers that be in our society...’ He refers further to (Castells 2010: Location 11514):

...the conflictive differentiation of time, understood as the impact of opposed social interests on the sequencing of phenomena. Such differentiation concerns, on the one hand, the contrasting logic between timelessness, structured by the space of flows, and multiple, subordinate temporalities, associated with the space of places. On the other

⁶ Castells (2010: Location 10489-10623) also draws attention to the fact that there are different ways to resist the ostensibly unstoppable encroachment of the “space of flows”, such as a certain kind of architecture, or multicultural urban neighbourhoods such as Bellevue in Paris (which has successfully prevented the urban gentrification which is the vanguard of the networked elites; other cities, like Irvine in California, have been less successful), or large-scale resistance to the economic imposition of it, such as that staged successfully in Tokyo in 1995.

hand, the contradictory dynamics of society opposes the search for human eternity, through the annihilation of time in life, to the realization of cosmological eternity, through the respect of glacial time.

It does not exactly take a genius to infer from this that technological development, culminating in the world-transforming introduction of spatial and temporal modalities that run counter to the “natural” time and space-experiences that humans have had for millennia, have put the human species (and all other living creatures on the planet) on a collision course with Mother Nature, that is, with the earth, supposedly our home.

The fading of interpersonal communication in the time of cyberspace

Earlier I referred to the ambivalence of the erosion of the human life-world in respect of communicational relations, adding that it involves the mediating function of electronic information-technology. At the outset one should not delude oneself about life-world communication, however – as in the case of electronically mediated communication, “direct”, face-to-face communication is just as much subject to varieties of misunderstanding as any of the mediated kind. This has been incontrovertibly demonstrated by Jacques Derrida, most pertinently in *Ulysses Gramophone* (1991; see also Olivier 2009). Hence, what differentiates between concrete, interpersonal communication and communication by means of smartphones and the like, is *not* that the latter is susceptible to breaks or obstacles in communication from which the former is exempt. Rather, according to Sherry Turkle (2010) – one of the leading thinkers worldwide in this domain – the difference concerns the noticeable growth in people’s unwillingness to “face” other people in both the concrete and the metaphorical sense of the word. And this increasing reluctance has a flipside: people prefer to put a screen between them and others; having been given the option through technological advances, they favour the opportunity to hide in cyberspace, rather than squarely confronting the difficulties accompanying complex human relationships. In *Alone Together* she remarks (2010: 16-17):

I once [in *The Second Self*, 1984; B.O.] described the computer as a second self, a mirror of mind. Now the metaphor no longer goes far enough. Our new devices provide space for the emergence of a new state of the self, itself, split between the screen and the physically real, wired into existence through technology... Overwhelmed by the volume and velocity of our lives, we turn to technology to help us find time. But technology makes us busier than ever and ever more in search of retreat. Gradually, we come to see our online life as life itself. We come to see what robots offer as relationship. The simplification of relationship is no longer a source of complaint. It becomes what we want. These seem the gathering clouds of a perfect storm. Technology reshapes the landscape of our emotional lives, but is it offering us the lives we want to lead?... And are we comfortable with virtual environments that propose themselves not as places for recreation but as new worlds to live in?

One should hear alarm bells ringing loudly when you read that Turkle describes the “new state of the self” as “itself” (apart from the associations with the Freudian “Id”, itself the clumsy English for the German “Es”, which means “It”), by which she clearly suggests, among other things, an impersonal, neutral, possibly even “inhuman” sense of the self. But she does not leave it at that. Discussing the neologism, “life mix”, for the curious phenomenon of perpetually being suspended between two ontological domains or spaces, place-space and cyberspace, she observes (2010: 159-160):

You need mobile communication to get to the notion of the life mix. Until recently, one had to sit in front of a computer screen to enter virtual space. This meant that the passage through the looking glass was deliberate and bounded by the time you could spend in front of a computer. Now, with a mobile device as portal, one moves into the virtual with fluidity and on the go. This makes it easier to use our lives as avatars to manage the tensions of everyday existence. We use our social networking to be “ourselves”, but our online performances take on lives of their own. Our online selves develop distinct personalities. Sometimes we see them as our “better selves”.

No one should ignore the register in which she concludes the last sentence, intimated by her use of “better”, namely the axiological, the register of value. The mere fact that people can experience the “selves” or avatars that represent our

“primary” selves in cyberspace as somehow “better” is symptomatic of something well known to philosophers: it is called “alienation”.⁷

Cyberspace and politics

After an overview of the vacillation between utopianism and dystopianism, optimism and pessimism, acceptance and rejection, regarding technology in the course of a century from the late 19th to the early 21st centuries (where pessimism dominated until the invention of the internet), Andrew Feenberg concludes his informative essay on a politically optimistic note. Apropos of the advent of the internet he observes (2004: 104): “But the dystopians did not anticipate that, once inside the machine, human beings would gain new powers they would use to change the system that dominates them. We can observe the faint beginnings of such a politics of technology today.” Faint indeed, but discernible – in among other things the familiar Wikileaks phenomenon as well as the Edward Snowden affair (see Olivier 2011 and 2014a) – although evidence suggests that the vast majority of people don’t perceive the internet as a place where they can and should fight for their rights, as Sherry Turkle (2010: 262-263) reports. Recounting the occasion of a Webby Awards ceremony around the time when the debate about the legitimacy of US government surveillance of its citizens first erupted, she listened to a “Web luminary” justifying such surveillance by turning Michel Foucault’s well-known critique of “panoptical society” (1995) – where the omni-visibility of everyone has the effect of the citizenry engaging in self-surveillance and self-discipline – on its head. This tech-guru argued, ingenuously and without a hint of irony, that there was no problem with government surveillance, and “as long as you are not doing anything wrong, you are safe” (2010: 262) And: “The way to deal is to just be good” (p. 263). The pervasiveness of cyberspace, which has led to our over-exposure in the space of flows, has brought us to this sorry pass, where citizens of what is putatively the “greatest democracy on earth”, have developed amnesia about the defining features of democracy. Turkle puts it inimitably (2010: 263):

But sometimes citizenry should not simply “be good”. You have to leave space for dissent, real dissent. There needs to be technical space (a sacrosanct mailbox) [i.e. a space where no one will meddle in your private affairs; B.O.] and mental space. The two are intertwined. We make our technologies, and they, in turn, make and shape us...In democracy, perhaps we all need to begin with the assumption that everyone has something to hide, a zone of private action and reflection, one that must be protected no matter what our techno-enthusiasms.

The further cyberspace-enabled snooping by governments (not just that of the US) penetrates into the private lives of people in so-called “democracies”, the more it appears to erode their very awareness of democratic rights and principles. This should not surprise anyone. Who has forgotten that totalitarianism starts growing when state power (and not only state power; today this includes the corporations) commences with an incremental assertion of its force and capacity to impose itself on citizens, who predictably mostly withdraw after witnessing the first casualties among those who resist? The same pattern is beginning to unfold, as Turkle’s account, above, testifies. And the fact that cyberspace permeates the fabric of society is the condition of the possibility of an incipient new fascism.

Conclusion: The logic of “both/and”

In the light of the preceding, what should one do? Is there a course of action that would not amount to either uncritical technophilia or outright Ludditism? Consider the following. Of sentences uttered by people, in which they use the personal pronoun, “I”, Turkle remarks (2010: 166):

⁷ Regarding the topic of alienation, it is noteworthy that, if someone like Sherry Turkle, who has been no enemy of communications technology – in her earlier work, especially *Life on the Screen* (1995) she was generally upbeat about the exciting new possibilities opened up by the internet and related phenomena – can articulate such grave misgivings about our relation with technology, the tone of such doubts encountered on the part of other techno-critics is far more sombre and severe. I am thinking in particular of Gilbert Germain, Jean Baudrillard and Paul Virilio, on whose work I cannot elaborate within available space (see Germain 2004 and Olivier 2011b in this regard).

This formulation contrasts with a growing reality of lives lived in the continuous presence of screens. This reality has us...learning to see ourselves as one with our devices. To make more time to think would mean turning off our phones. But this is not a simple proposition since our devices are ever more closely coupled to our sense of our bodies and minds. They provide a social and psychological GPS, a navigation system for tethered selves.

This is what I meant earlier when I said that the sense of the human life-world has become ambivalent – what used to be a human self is now, in the time of cyberspace, and of the “space of flows”, something stretched between the space of places where you walk towards the fridge to get a drink and virtual reality, the portal to which is right there, in your hand or on your desk in the shape of a mobile device or smartphone. But although most constantly connected people would rather die than give up being “tethered” to their personal gateway to cyberspace, Turkle draws attention to the signs that people have increasing difficulty in handling the plethora of “texts” and e-mails that inundate you relentlessly. “We have reason to worry” (p.167-168), she says. “These days, as a continuous stream of texts becomes a way of life, we may say less to each other because we imagine that what we say is almost already a throwaway. Texts, by nature telegraphic, can certainly be emotional, insightful, and sexy. They can lift us up. They can make us feel understood, desired, and supported. But they are not a place to deeply understand a problem or to explain a complicated situation. They are a momentum. They fill a moment.”

It is telling that Turkle uses a spatial metaphor, “place”, to name the ontological realm of “texting”, namely cyberspace. It is accurate, because it emphasizes what thinkers from Gibson to Castells, Baudrillard, Virilio and Germain have recognized, to wit, that cyberspace is a distinctive mode of spatiality, distinct from the space of our inalienable embodiment. This alone should be sufficient to make us sit up and take notice of the tendency, to devalue our embodiment – the inescapable fact of having bodies – and to embrace it as a condition of being-human. This does not mean that we have to give up our mobile phones, iPads, tablets and the like; in true poststructuralist fashion we should adopt the logic of “both/and” instead of the logic we were brought up on, the Aristotelian “either/or”. One could have all that, without letting it have ALL of yourself. Instead of rushing headlong into cyberspace, believing unreflectively that this is an alternative to the “natural” life-world of embodiment, we should pause a moment and reflect on what it is that we would give up – the spatio-temporal realm of cuddling your beloved, or your child, or your pet, the sphere of celebrating a birthday around a table, of following a mountain trail in thick forest, of swimming in the ocean. If you are willing to give that up, you may as well be a robot, with nothing more than what it has been programmed to do. People celebrate; robots don’t.

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Cyber Bullying Among Children and Adolescents: A Systematic Review

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Abstract

The Centre for Justice and Crime Prevention recently reported that in South Africa one in three children have been the victim of cyberbullying. In response to this burgeoning practice of cyber aggression, international research has been conducted into the various dimensions of this modern type of bullying. The objective of this systematic review was to collate relevant information and existing research on the impact of bullying through the medium of electronic communication (cyber bullying). The Nelson Mandela Metropolitan University has identified Cyber Citizenship as one of its core institutional research themes. This ten year plan is in response to a governmental imperative for research at South African universities to be responsive to societal and national needs. Cyber bullying forms an important facet of this research theme.

Literature published between 1970 and 2013 was reviewed with the focus on the impact of cyber bullying on children and adolescents in the age group of 10 to 18 years with the goal of the development of systemic prevention and protection strategies for vulnerable children and adolescents. Furthermore, the study reviewed the psychological sequelae of malicious cyber aggression.

Both qualitative and quantitative studies from research sources are included. Organization, synthesis and the review of the data utilized an integrative review method with meta-analysis to address the data in a Systems Theory framework. The systematic research review represents the current state of knowledge regarding cyber bullying and has collated disparate research by assessing available and relevant information with certain stated restrictions on publication date, population characteristics and research resources.

Key words

Bullying, cyber aggression, cyber bullying, systemic prevention

Introduction

The year 2009 marked the 40th anniversary of the Internet, which has done more to transform the world than any technological advance since the printing press (Jacobs, 2010). Once only possible in the realm of spies, secret agents and the minds of conspiracy theorists, near instant communication via mobile cellular telephones and the World Wide Web is today, a reality. Mobile Internet can best be described as a means of 'wireless access to the digitized contents of the Internet via mobile phones (Chae and Kim, 2003).

Personal and social interaction has been revolutionized in a generation. 1988 saw the birth of the first public chat rooms, Internet Relay Chat, and the first malicious Internet-based attack (Chapman, 2009). In 2009, Uruguay provided every learner in public elementary school with a computer through the 'One Laptop Per Child' program, in July 2010 Internet access became a 'legal right' in Finland and France has made access to the Internet a 'human right' (Jacobs, 2010).

In 2012 UNICEF, in conjunction with the social networking platform Mxit conducted research into the mobile phone usage and the youth of South Africa. Many South African youths have access to mobile devices and the Internet and yet

South Africa struggles economically and educationally. In a summary of the findings of this study the researchers report that South African adolescents and youth are the first adopters of mobile technology with 72% of the 15 to 24 year age group owning or having access to a cell phone. They also state that the primary risks faced by South African adolescents and young people online are talking to and meeting strangers, cyber bullying and sexting (UNICEF, 2012).

1. Cyber Bullying

There is no doubt that the Internet has changed the lives of many adolescents. For many, the Internet is all that children and adolescents have ever known, having been born into the online generation. With this electronic world comes the lawless world of the World Wide Web (Kowalski *et al.* 2008). “Kids can be cruel. And kids with technology can be cruel on a world-wide scale” (Sullivan, 2006, pp.1).

Cyber bullying is defined as bullying which involves the use of information and communication technologies such as email, cell phone and text messages, instant messaging, defamatory personal websites, and defamatory online personal polling websites to support deliberate, repeated and hostile behaviour by an individual or group that is intended to harm others (Belsey, 2005). Bullying is considered part of humanity and children who are traditionally bullied fall into one of two categories – those who are passive or submissive, and a smaller number that are considered ‘provocative victims’ or ‘bully/victims’ (Kowalski *et al.* 2008).

Cyber crime forms part of cyber citizenship and encompasses cyber bullying, referred to as cyber stalking when involving persons over the age of 18 years of age. Seen as psychological attacks rather than physical threats of harm, cyber bullying and cyber stalking have not received the same judicial intervention as has other cyber crimes. South Africa lags behind North American and European countries in the reported occurrence of cyber bullying and therefore there is a struggle to gain support and governmental level intervention. Even legislature and law enforcement officials appear to be unprepared and not fully equipped to deal with these new developments in a balanced and effective manner (Badenhorst, 2011). However, in April 2013 the South African government legislated the Protection from Harassment Act. This Act affords the victims of harassment an effective remedy against harassment (Hofmeyr, 2013). One of the areas of harassment that this Act provides protection against is electronic harassment.

An integral aspect of cyber bullying involves either inflicting mental anguish to cause the victim to fear for their physical safety, or breaking down self-esteem and confidence (Shariff, 2009). The consequences can be psychologically devastating for victims and socially detrimental for all learners (Gáti *et al.* 2002). One characteristic specific and prevalent in cyber bullying is the anonymity offered by the virtual environment of the Internet. Most cyber bullying is anonymous and due to the various platforms and resources available it is simple for one determined bully to become a legion of bullies. The anonymity afforded by the Internet can lead children to engage in behaviours that they might not display face-to-face. Ironically, it is their very anonymity that allows some individuals to bully at all (Hazelden Foundation, 2011). Another cyber specific aspect is the infinite audience. Hundreds of perpetrators can get involved in the abuse, and classmates who may not engage in bullying at school can hide behind technology to inflict the most serious abuse (Shariff, 2009). Sexual and homophobic harassment is also more prevalent in cyber bullying. Finally, the permanence of expression online, whether via cell phone or the Internet leave messages and bullying that are hard to erase. The digital footprint is a permanent mark.

2. Methodology and Data Analysis

A systematic review was the methodology that was used by the reviewers. The purpose of a systematic review is to sum up the best available research on a specific question. This is done by synthesizing the results of several studies (The Campbell Collaboration, 2009). The core of evidence synthesis was the systematic review of literature of a particular intervention, condition or issue. The systematic review is essentially an analysis of the available literature (that is, evidence) and a judgment of the effectiveness or otherwise of a practice, involving a series of complex steps (The Joanna Briggs Institute, 2011).

The data the reviewers sampled was from articles in scholarly journals, books, theses and computerized databases. The data needed for this systematic review was located by using the following sources and databases: The Millennium Web Catalog that shares an information system with other libraries of SEALS (South East Academic Libraries System) in the Eastern Cape, EBSCOhost consisting of various databases including but was not be limited to GALE: Academic OneFile, Academic Search Complete, JSTOR, Masterfile Premier, Taylor & Francis Online – All Journals, Wiley Online,

CINAHL with Full Text, Health and Wellness Resource Center, Health Source – Nursing Edition, Health Source – Consumer Edition, Medline, PsychINFO, PubMed, SPORTDiscus Full-Text, Article First, Communication & Mass Media, Emerald Insight, ERIC. The reviewer used keywords, authors, titles, or subjects relating to the review topic.

Select criterion was used by the reviewer in order to select relevant articles for the study. Articles were not limited to information exclusively about either males or females; neither were they limited to persons of a specific socio-economic status or culture. The review was limited to articles written in English. Systematic research on the topic of bullying became popular from the early 1970's, therefore the reviewer only considered literature published from 1970 to 2013 and a minimum of 40 reports were reviewed.

For data analysis the reviewers synthesized and combined all the results from the studies selected for inclusion and any discrepancies or differences in the studies was determined. Any samples not used were noted and limitations were identified. The reviewer generated a grid for each article that met the inclusion criteria. This enabled the reviewer to ask certain questions of each article, and thus allowed a more objective, systematic, and organized review.

Reliability and Validity

The reviewer designed a questionnaire grid for use in this systematic review, which asked a minimum of 15 questions of each article. All articles were then reviewed by applying the same set of questions to each individual article. The grid designed for this research report allowed each article to be reviewed more objectively and consistently.

The articles for inclusion in this review were carefully selected by the reviewer, with the assistance of the reviewer's supervisor, to prevent the reviewer's personal beliefs from entering into the selection process, and thus also preventing a biased outcome by citing only appropriate studies. This enabled articles selected for inclusion to be more objective. The grid included questions regarding each article's reliability and validity, in order to ensure their credibility.

3. Findings and Discussion

During the data extraction and review process contradictory evidence was found in the articles used during the systematic process regarding the prevalence of cyber bullying. Some studies state that the prevalence of cyber bullying, although concerning, is not the overwhelming threat that has been suggested by other studies and that the numbers of learners admitting to being victims of cyber bullying is less than the number of learners reporting to being victims of traditional bullying. The debate continues between modern researchers regarding the prevalence of cyber bullying although the researchers stress that even one victim of cyber bullying is too much. The need to understand the prevalence of cyber bullying is linked to the understanding of the phenomenon and thereby the call for the development of intervention and protection strategies.

The following studies report a low prevalence rate (<15%) of cyber bullying among children and adolescents aged 10 to 18 years: Erdur-Baker (2010), Skrzypiec *et al.* (2011), Sakellariou *et al.* (2012), Pelfrey and Weber (2012), Navarro and Jasinski (2011), Allen (2011), Slonje *et al.* (2012), Slonje and Smith (2008), Smith *et al.* (2008), Aricak *et al.* (2008), Dempsey *et al.* (2009), Kite *et al.* (2010), Erentaite *et al.* (2012) and Vandebosch and Van Cleemput (2009). These studies report a prevalence rate of between 4.2% and 14%. The incidents reported occurred over a one week to one year period leading up to the date the information was collected for the studies.

The following studies reported a high prevalence rate (>15%) of cyber bullying among children and adolescents aged 10 to 18 years: Li (2006), Li (2010), O'Brien and Moules (2012), Mark and Ratliffe (2011), Dehue *et al.* (2008), Juvonen and Gross (2008), Didden, *et al.* (2009), Price and Dalgleish (2010), Hinduja and Patchin (2010), Patchin and Hinduja (2010), Vieno *et al.* (2011) and Burton and Mutongwizo (2009). These studies report a prevalence rate of between 15% and 72%. The incidents reported occurred over a one week to one year period leading up to the date the information was collected for the studies.

The discrepancy of percentages of children and adolescents reported as victims of cyber bullying is concerning. Formulating future research based on the rate of prevalence is difficult not only because of the significant range of reported incidents but other factors related to the prevalence of cyber bullying need to be considered. Aricak *et al.* (2008) reports that a positive correlation was found between the frequency of Internet use and being exposed to disturbing behaviour and receiving unwanted emails. Juvonen and Gross (2008) stated that the risk of repeated cyber bullying was significantly predicted not only by the use (vs. nonuse) of IM and Webcams but also by relatively heavy (vs. light) use of

Webcams as well as message boards. Therefore the sample groups reported on in the studies need to be evaluated for access to and usage of the Internet and social networking sites. This includes factors such as socio-economic status and other factors that may predispose children and adolescents to cyber bullying.

Li (2010) found when gender was considered, research demonstrated that males and females showed different patterns in bullying-related behaviours. Navarro and Jasinski (2011) stated that adolescent females, on average, experienced more cyber bullying than adolescent males. Mark and Ratliffe (2011) found that females were more likely to be cyber bullied than males, and Allen (2011) found that 11.9 % of female learners and 8.3% of male learners report being victims of cyber bullying. Schneider *et al.* (2012) state that overall reports of cyber bullying and bullying victimization is higher among girls than among boys (18.3% vs. 13.2%), Hinduja and Patchin (2008) indicated that girls are more likely to be involved as the perpetrators of bullying and cyber bullying. South African researchers Burton and Mutongwizo (2009) found that 33.1% of girls experienced cyber bullying in a 12 month period compared to 29.3% of boys. O'Brien and Moules (2012) stated that more girls than boys reported having been cyber bullied.

Contradicting the findings of the previously mentioned researchers, Erdur-Baker (2010) states that female learners are less likely to be involved in cyber bullying or cyber-victimization than male learners. Li (2006) also found that female learners were less likely to be cyber bullies (11.6 %) compared to male learners (22.3%), Sakellariou *et al.* (2012) reported that boys ages 13 to 15 years were significantly (9.2%) more likely to be cyber bullied than children and adolescents of other ages, Aricak, *et al.* (2008) state that more boys than girls were cyber bullies, cyber-victims and cyber bully-victims, Didden, *et al.* (2009) found boys are more often involved in victimization and bullying via cellphone than girls, Pelfrey and Weber (2012) indicated that male learners were more likely to commit cyber bullying

A number of studies found that gender did not predict cyber bullying. Li (2006) found that both genders are equally likely to be victims of cyber bullying, 25.6 % for female learners and 25% for male learners, Skrzypiec *et al.* (2011) report that both male and female learners report being cyber bullied and Slonje and Smith (2008) found that there is no significant difference with regards to gender for being bullied or cyber bullied. Slonje *et al.* (2012) also found no significant difference with regards to gender as a predictor for cyber bullying.

Understanding the likelihood of victims of cyber bullying to seek help after victimization is an important component for the development of protection and intervention strategies. Skrzypiec *et al.* (2011) found that female learners were more likely to seek adult support when the victims of bullying. Craig *et al.* (2007) reported that from a list of 12 possible strategies to respond to bullying girls were more likely to choose or try 3 to 6 different strategies and boys were more likely to attempt one or none. Female learners were more likely to choose the options linked to reporting the cyber bullying to an adult than the male learners. Boys were more likely to use physical aggression, humour or revenge to stop the bullying. Dempsey *et al.* (2009) showed that significant gender differences were found, 17% of female learners reported being cyber bullying compared to 11% of male learners. In their study sampling learners from Australia and Austria, Dooley *et al.* (2010) found that 85.1% of Australian learners stated that they will ask for help if experiencing cyber bullying. Female learners (89.8%) were more likely to ask for help than male learners (78.9%). 42% of Austrian female participants stated they asked for help as victims and 19% of male learners. Kite *et al.* (2010) stated that 44% of learners indicated that they would tell an adult if they are experiencing bullying online but no gender differences were indicated.

Topcu and Erdur-Baker (2012) explored the role of cognitive and affective empathy as mediators for bullying behaviour and the corresponding differences between male and females with regards to bullying. They found that there is a difference in how empathy mediates cyber bullying and bullying behaviour. Hinduja and Patchin (2007) state that victimization and perpetration are inextricably linked, a large proportion of those who are cyber-victims are also cyber-aggressors. This finding is supported by Didden *et al.* (2009) concluding that most online bullies were also online victims.

Craig *et al.* (2007) state that children who are victimized by their peers can experience a wide range of problems, particularly if the victimization is prolonged. Problems include academic difficulties, health problems, and a decrease in self worth or social isolation. Victimized children are at high risk for psychosomatic symptoms like difficulty sleeping and bed wetting. They are also 1.6 to 6.8 times more likely to report depressive symptoms than non-victimized children. Victimized children are at high risk for disliking and avoiding school. Sakellariou *et al.* (2012) report that 28% of the male learners sampled reported that they experienced distress after receiving threatening or hurtful emails. Li (2010) states that cyber bullying can be devastating for victims and their families. The psychological harm inflicted by cyber bullying, just like bullying, is reflected in low self-esteem, school failure, anger, anxiety, depression, school avoidance, school violence and suicide. It is even possible that the damage from cyber bullying would be greater than bullying because there is no escape for the cyber victims. O'Brien and Moules (2012) found that young people in the study identified the psychological and emotional impact cyber bullying can have on those in receipt of it, including being

upset, suffering from depression and sadness. Some even reported that, like other forms of bullying, cyber bullying victimization can lead to attempted and successful suicides. Cyber bully victims reported that it affected their confidence, self-esteem, mental health, well-being and attendance at school. Allen (2011) states that not only has technology afforded youth the ability to aggress secretly but it may also hide from adults the signs of deteriorating mental health that contributed to suicide. Dehue *et al.* (2008) found that most children reported feeling angry, sad and did not like going to school. This study suggests evidence for a relation between depressive symptoms and bullying on the Internet. Aricak *et al.* (2008) study indicates that indirect bullying has adverse effects on children, such as depression. This behaviour may affect learner's mental health.

Juvonen and Gross (2008) state that online experiences of bullying are associated with elevated levels of distress much like encounters of bullying encountered in school. Didden *et al.* (2009) reports that the more often a learner was victimized via the Internet the less self-esteem and more depressive feelings he/she reported. The results clearly indicated that there is a relationship between cyber bullying and emotional distress and psychological problems.

Price and Dalgleish (2010) found that the most common impacts of cyber bullying include damage to self-confidence (78%), self-esteem (70%) and friendships (42%). There was a report of negative effect on school grades and school attendance and family relationships. Many participants also reported multiple emotional impacts. 75% of participants reported feeling sad, 54% claimed feelings of extreme sadness. Feelings of anger, annoyance, frustration, embarrassment, fear including some who felt terrified. 3% of participants reported having suicidal thoughts and 2% claimed that they engaged in self-harming behaviour as a result of cyber bullying. Hinduja and Patchin (2010) in their research sample found 20% of respondents reported seriously thinking about attempting suicide while 19% reported attempting suicide. Bullying and cyberbullying victimization was a stronger predictor of suicidal thoughts and behaviours than was bullying and cyber bullying offending. Cyber bullying can cause children and adolescents to experience low self-esteem, Patchin and Hinduja (2010) noted that during the late 1970's and early 1980's educators began to recognize that low self-esteem was one of the primary predictors of many adolescent problems that directly and indirectly affected school health by impacting the overall academic and behavioural performance of learners. Dooley *et al.* (2010) report that a statistically significant positive relationship between victimization (cyber or traditional) and self-reported emotional symptoms was found in both Australia and Austria. Learners from Australia and Austria who were victimized were more likely to report more emotional symptoms. Perren *et al.* (2010) found that cyber-victimization was a significant predictor of depressive symptoms. This result suggested an additional negative mental health status associated with being exposed to bullying via technology over and above that of being victimized by traditional means. Goebert *et al.* (2011) report that cyber bullying victimization increased the likelihood of substance use, with binge drinking and marijuana use approximately 2.5 times more likely to occur, increased the likelihood of depression by almost 2 times, and suicide attempts by 3.2 times (3.2 times for females and 4.5 times for males). Cyber bullying alone was not a significant predictor of depression or anxiety. Bullying victimization was consistently and robustly associated with an increased likelihood of psychological distress across all measures from depressive symptoms and suicidal ideation to reports of self-injury and suicide attempts. Furthermore, the relationship between victimization and distress was strongest among learners who were victims of both cyber and school victimization. Similarly attempted suicide was highest among victims of both cyber and school bullying (Goebert *et al.* 2011).

Cetina *et al.* (2012) found that cyber bullying positively predicated psychological disharmony. Depression and anxiety are mostly related to cyber bullying than other psychological distresses. Cyber bullies hold feelings of hostility against others and therefore their interpersonal environment is characterized by peer rejection. Cyber victims feel angry towards cyber bullies and bystanders, lonely and dissatisfaction from peer relationships, and have lower levels of social support.

Li (2006) concludes that cyber bullying is bullying that occurs in a new context and the two types of victimization are related. Topcu and Erdur-Baker (2012) also states evidence for similarities in the natures of traditional and cyber bullying; Li (2010) reports that bullying, cyber bullying and victimization are close related. Li (2010) also noted a pattern that students who are physically stronger are less likely to be victims or bullies in traditional bullying and this was discerned to be similar in cyberspace. An earlier study by Li (2006) showed that about half of traditional bullies are also cyber bullies. Pelfrey and Weber (2012) found that both victims and perpetrators of cyber bullying have a number of co-existing variables including the engagement in traditional bullying. This is also true for victims of traditional bullying. Juvonen and Gross (2008), Smith *et al.* (2008), Smith *et al.* (2008), Dehue *et al.* (2008) and Perren and Gutzwiller-Helfenfinger (2012) found that school bullying experiences increased the likelihood of cyber bullying, independently of the type of electronic media used and that perpetration predicts the same roles in cyber bullying. Juvonen and Gross (2008) reported an 85% overlap between online and in-school bullying experiences. These findings are echoed by Hinduja and Patchin (2008) who state that cyber bullying does not seem to be a behaviour problem that is independent from traditional bullying in that offline victims are also at risk to be the victims online; in addition, offline

perpetrators seem to be at greater risk to be perpetrators online. Vazsonyi *et al.* (2012) indicate that low self-control clearly impacts cyber bullying, and because this effect was mostly indirect through correlates, they conclude that cyber bullying simply seems to be a specific form of traditional bullying. Price and Dalgleish (2010) report that results surrounding relationships between cyber bullying and traditional bullying and victims as bullies showed 51% had also been bullied face-to-face. Tangen and Campbell (2010) found that 17.1% of participants report experiencing both face-to-face and cyber bullying as victims in the year of the study and 8.6% of participants stated that they have participated in bullying and cyber bullying behaviour in the last year. Perren *et al.* (2010) stated that 39% of victims of traditional bullying reported experiencing cyber bullying and that 22% of participants in traditional bullying reported participating in cyber bullying activities. Schneider *et al.* (2012) found that 59.7% of cyber bullying victims were also traditional bullying victims and 36.3 % of traditional bullying victims were also cyber bullying victims. Erentaite *et al.* (2012) state that 35% of traditional bullying victims reported re-victimization in cyberspace one year later.

A study by Erdur-Baker (2010) reported no correlation between the bullies and victims of cyber bullying and traditional bullying. It is concluded that despite efforts in the research community, the relationship between traditional bullying and cyber bullying has not yet been substantiated. Research conducted by Hemphillet *et al.* (2012) found that relatively few students (less than 17%) experienced both traditional bullying and cyber bullying victimization. Sakellariou *et al.* (2012) found that 15% of male learners reported that they found cyber bullying more distressing than face-to-face bullying and 30 % found it equally as upsetting or distressing as traditional bullying.

Skrzypiec *et al.* (2011) suggest interventions focused on bullying can empower victims and assist them to respond more effectively to bullying. Craig *et al.* (2007) suggest that it is important to provide children and youth with strategies that are effective, boys in particular, as they are most likely to implement strategies that are only going to increase the victimization over time. Topcu and Erdur-Baker (2012) state that to combat cyber bullying intervention programs should place greater emphasis on increasing both cognitive and affective empathy as findings suggest that their combined effect mediates the relationship between gender and cyber bullying. One critical recommendation to psychology practitioners in schools is to emphasize the increase in affective empathy while working to prevent traditional bullying, because a deficiency in affective empathy has a unique role in leading to traditional bullying. It is essential to teach adults about technology and cyber bullying. Learners should be aware of the responsibilities of Internet use and the consequences of misuse of technology so that responsible behaviours can be promoted at an early age. Hemphill *et al.* (2012) agree that schools should implement programmes to educate parents and other adults about bullying and cyber bullying as bullying behaviour threatens the cohesion of schools. Schools need to enforce intolerance of any intimidation among learners, regardless of whether it takes place on or beyond the school grounds. Didden *et al.* (2009) report that dealing with cyber bullying in a school for learners with developmental disabilities may be difficult. An approach is needed in which learners, teachers and parents work together. Teachers should become more aware about the issue of bullying via electronic tools in learners with developmental disabilities. Patchin and Hinduja (2010) state that it is imperative that school health professionals identify and intervene in cyber bullying incidents. Dooley *et al.* (2010) found that it is important to investigate why young people are more reluctant to report incidences of cyber bullying compared to traditional bullying and suggest it may be that school reporting methods that are more orientated towards traditional than cyber bullying behaviours. Tangen and Campbell (2010) report that the incidence of cyber bullying in the sampled primary schools is equivalent to secondary school cyber bullying. Tangen and Campbell (2010) also state that there are clear indications that teachers and guidance counsellors need to extend both prevention and intervention programs about cyber bullying to much younger learners. This will also require training of school personnel in engaging in the digital world of the learners so that the learners have more confidence in the adults at their schools. Patchin and Hinduja (2011) suggest trying to preempt youth from attempting to reconcile strained circumstances and negative emotions in an unconstructive or deviant manner. Findings suggest that schools provide health education programming and emotional self-management skills to reduce the likelihood of significant strain resulting from interpersonal strife and conflict. With the use of classroom teaching modules or school wide assemblies, educators might cover personal safety and defense; the defusing of potentially explosive interactions; stress management; the types of hostile behaviour of which law enforcement should be made aware of, and provide a clear reminder that no one deserves to be mistreated. Learners must feel comfortable to openly approach and speak to faculty and staff on their school campus, which requires the provision and maintenance of an empathic and nonthreatening environment.

Cyber victimization is a systemic issue and parental intervention and support is important for successful prevention strategies. O'Brien and Moules (2012) suggest that a considerable number of young people were ready to tell parents and other adults about the cyber bullying so it may be worthwhile to explore what makes some adults more approachable. Mark and Ratliffe (2011) recommend that parents need to be educated about the types of technology and dangers on the Internet. School and home cannot be divided on attempts to prevent and intervene in cyber bullying. Slonje and Smith (2008) report that certain types of cyber bullying (picture/video clip bullying) may be noticed by adults but the other

types of cyber bullying (text message bullying, email bullying and phone-call bullying) is not likely to be noticed by adults. Parents need to be educated to be more aware of the subtler types of cyber bullying.

Li (2006) recommends that education dealing with cyber bullying related issues should be a joint endeavour of schools, families, communities and the whole society. It supports the idea that the concern for the cyber bully issue 'must be at many levels, not only for the individuals themselves and their families but also society at large' (Morrison, 2002). Sakellariou *et al.* (2012) report that adult awareness about the nature of cyber bullying, its consequences and what actions can be mobilized is extremely important. Professional development for teachers and parents is required. The design and development of collaborative interventions which involve the individuals, families and schools are important. The involvement and education of psychologists about the impacts of cyber bullying and the role that electronic communication and media has on the lives of children and adolescents is essential. Adult supervision of the use of electronic media in school and at home must be developed and implemented. Parents need to maintain a supervisory involvement when incidences of cyber malevolence are discovered and schools need to develop and implement electronic monitoring of computers and systems. The digital generation gap for parents needs to be closed through education and awareness (Smith *et al.* 2008). Many adults of the current parental generation are not aware of the potential of mobile phones and the Internet to the same extent as young people. An obvious step is to include cyber bullying education explicitly in school anti-bullying policies and anti-bullying materials workshops, as well as provide guidance for parents with some guidance for children and young people. Specific interventions are needed, including how to contact mobile phone companies and Internet service providers and legal rights in these matters. Dehue *et al.* (2008) suggest that interventions should therefore be aimed not only at youngsters but also at their parents and their social environment, including teachers. Aricak *et al.* (2008) report that their research on cyber bullying emphasizes the importance of security in the virtual world. Parents and teachers see physical bullying as more serious and harmful than verbal and indirect bullying and are less likely to intervene when children experience indirect bullying. Didden *et al.* (2009) report that it is important for schools to have a model of legal regulations relating to cyber bullying and its impact on learner safety and learning in the school context. Parents may be advised to exert more control over their children's activities and at the same time provide them with information on how to use these tools. Dempsey *et al.* (2009) recommend that it may be beneficial for parents to discuss cyber victimization with their children and to encourage them to recognize and report incidents of cyber aggression. Schools should also take proactive steps to decrease opportunities for cyber victimization by developing and strictly enforcing policies regarding appropriate use of Internet and cellular phones on school grounds and providing immediate and consistent discipline for aggressors both on-and offline. This may include providing clearly stated rules to learners about appropriate Internet use, adult presence in computer laboratories, and investigation of reports for cyber victimization. Hinduja and Patchin (2010) suggest that parents and educators should discuss the link between offline and online peer harassment and suicidal thoughts and ought to consider utilizing stories in the news to underscore the seriousness of the matter. Goebert *et al.* (2011) suggest a multifaceted prevention and early intervention approach is needed to reduce cyber bullying. Parents can work with their children to establish and monitor their social networking sites. Parents need to be aware of signs and symptoms of cyber bullying. Schools are encouraged to set up age appropriate guidelines for appropriate use of communication technology. Schools can work with the parents to stop and remedy cyber bullying situations. They can also educate the learners on cyber ethics and the law. Accordino and Accordino (2011) recommend involving learners in prevention efforts is a systemic intervention that helps both the bully and victim. Given that learners today have more confidence in using technology, this area seems important to address. Such efforts would include educating learners regarding safe Internet behaviour via a code of ethics (netiquette), providing ways to report early indications of possibly bullying behaviour and instructing learners in avoidance and de-escalation techniques.

Pelfrey and Weber (2012) suggest that learners who consistently perpetrate cyber bullying, an exercise that rarely leads to punishment or sanctions, are learning that negative behaviour does not generate negative consequences. Perren and Gutzwiller-Helfenfinger (2012) recommend that apart from promoting empathy and perspective taking, moral emotions like guilt and shame, pride and indignation. need to be addressed and contextualized within specific cyber bullying situations. Adolescents must be given time and room to ask questions, be allowed to establish classroom norms, attitudes and interaction styles, and to both develop and maintain pro-social norms and values. Ang and Goh (2010) recommend that empathy training and education should be included in cyber bullying intervention programs with additional emphasis on cognitive components of empathy for boys and affected cognitive empathy for girls. Interventions should include training on Internet etiquette (netiquette), and healthy Internet behaviour. The goal is to increase pro-social online behaviour and to reduce online aggression. Steffgen *et al.* (2011) suggest that the development of new anti-bullying training and improving empathy skills might be promising in decreasing both, traditional bullying and cyber bullying. Understanding and sharing the emotions of others seems to be a prerequisite of preventing such unwanted behaviour. Hinduja and Patchin (2008) report that it seems logical to adhere to the following in terms of policy solutions: ensure that those who are involved in traditional bullying are aware of their susceptibility to the on-line variety and to present

them with a systematic plan of action to preclude such an outcome. Burton and Mutongwizo(2009) recommend targeted interventions should be provided to young people identified as at risk for other forms of violent or antisocial behaviour, while the resilience of not at risk youth and children should be enhanced. Issues around cyber bullying and violence can be integrated into existing programmes already targeted at at-risk youth.

In summary, this review analysed recent reports regarding prevalence and gender as a predictor of cyber bullying, help seeking behaviour, and the overlap between online and offline bullying. The psychological sequelae of cyber bullying included academic difficulties, health problems, loss of self-esteem, depression and suicidal ideation and behaviour. Systemic intervention strategies highlighted should include families, schools, counsellors and society in general.

Conclusions, Recommendations and Limitations

This systematic review focused on cyber bullying amongst children and adolescents aged 10 to 18 years. Due to the vast nature of the research question the review briefly included information from articles selected and reviewed. The focus of the review was on the impact of cyber bullying on children and adolescents in the age group of 10 to 18 years with the goal of the development of systemic prevention and protection strategies for vulnerable children and adolescents. Furthermore, the study reviewed the psychological sequelae of malicious cyber aggression.

The reviewer found the vastness of the research question limiting in that the research quantity was large and difficult to collate. It is recommended that future researchers into cyber bullying identify specific areas of research and refine the research question thoroughly.

The rapidly changing nature of cyber space made the use of research data and statistics from merely two or three years ago nearly obsolete. The reviewer found this especially pertinent when reviewing research conducted in South Africa. The emergence of smart phones has changed the face of Internet usage and access in South Africa. The rate at which social networking sites have spread in popularity has also altered the nature of cyber bullying and victimization.

Access to certain online databases was limited as the reviewer's resource library gains access to certain databases on a trial basis and during the duration of this review a few databases were no longer accessible to the reviewer. These databases require considerable financial expenditure that the reviewer was not able to provide, to purchase full text articles.

The scope of this systematic review was limited by the reviewer working as an individual reviewer with the support of a research supervisor. The reviewer was unable to conduct as extensive a review as required to confidently and critically claim this review to be fully systematic.

Cyber bullying is a systemic issue and requires systemic action. Children and adolescents need to develop personal, emotional strengths and require support to overcome insecurities and self-esteem concerns. This type of personal development and support will increase their resilience when faced with cyber victimization. Parents, educators and society can provide the lessons, motivation and support for children and adolescents to develop this resilience.

It is recommended that further research continues into the aspects of personal development for individuals to assist in intervention and protection from cyber bullying. It is further recommended that South African researchers attempt to focus research on a South African population to allow a greater understanding of the effects of cyber bullying on children and adolescents of this specific population.

Due to the vastness of the research available and for the purpose of this review focus remained on the victims of cyber bullying. The reviewer recommends future systematic reviews focus on the cyber bullies and the bystanders of cyber bullying.

It is recommended that research is conducted within a South African context. South Africa presents a unique set of challenges for any researcher and the prevalence of cyber bullying is likely to be high and increasing with more children and adolescents gaining access to the Internet through the medium of mobile phones and government initiatives to provide cyber access. When considering the predictors for cyber bullying, South Africa is a vulnerable society.

A large amount of research has been and is currently being conducted in the area of cyber bullying and cyber aggression. The data collected by these researchers is valuable in assisting governmental organizations, communities, schools, families, parents and individuals to understand and formulate intervention and prevention strategies for cyber bullying.

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Young adults' experiences of Facebook

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Abstract

Social networking sites are a recent phenomenon and have experienced tremendous growth in popularity especially among young people. Such sites are changing the way individuals communicate with each other and the world, providing users with a unique computer-mediated environment where individuals are able to disclose their thoughts, feelings, and experiences within their own social network. The present study explored the experiences of young adults regarding Facebook. A transcendental phenomenological approach was used to elicit the essence of the experiences of the participants. Theoretical sampling ensured relevant participants were selected through haphazard sampling procedures. Data was collected through the use of biographical questionnaires and individual, semi-structured interviews. The data was processed according to four phenomenological principles, namely, epoche, phenomenological reduction, imaginative variation and synthesis using Tesch's eight steps. Lincoln and Guba's model was used to assess the trustworthiness of the data obtained. The participants described their experiences of Facebook highlighting how they use Facebook as a communication tool which assists them in their relationship maintenance with others. Participants use self-presentation on Facebook to manage how they are perceived and experience Facebook as having many privacy risks. Participants indicated that Facebook has addictive qualities and facilitates cyber stalking behaviour.

Key concepts: experiences, Facebook, social networking sites, transcendental phenomenology, young adults

1. Introduction

Social networking sites (SNS) constitute an important research area for scholars interested in online technologies and their social impacts. Researchers from diverse fields have studied the application, implications and practices of SNS. There has been remarkable growth and increased popularity of social networking sites amongst individuals of all ages, thus highlighting the need for academic study of the phenomenon (Joinson, 2003). Our understanding of social networking sites and their interaction with individuals is still very limited. Psychology lacks a theoretical framework from which to view all online behavior, therefore this study aimed to contribute to what is currently known about this field.

South Africa has experienced tremendous advancement in technology in the past years and thus the need for exploratory research in this context has arisen. The use of social networking sites is a very dynamic social phenomenon. There is a considerable body of research that has examined the experiences of adolescents' use of online social networking in North America, Europe and Asia. The study set out to build upon this body of knowledge by focusing on the experiences of young South African adult Facebook users, rather than adolescent users.

Little is known about the impact of these social networking sites on young adults in South Africa, therefore this study offers a unique perspective and highlights the need for more local research. A growing body of international literature has investigated different aspects of Facebook ranging from its capacity to assist in social capital formation, impression and identity management, privacy concerns, the expression of self and personality and online addiction (boyd & Ellison, 2008). Facebook is one of the most popular networking sites and has become an integral part of individuals' social interactions. The Facebook site has grown rapidly and currently has more than one billion users.

Social networking sites are often perceived as offering its users the ideal setting through which to present their 'hoped-for possible selves' (Mehdizadeh, 2010). Therefore it is of particular importance to seek to understand how the self is presented on social networking sites and how it contributes to interpersonal experiences.

The Internet presents several conceptual and theoretical challenges for researchers from a variety of fields, including but not limited to psychology, sociology, communication studies and information technology. Each of these fields have attempted to study different aspects of the internet and its impact on individuals. These researchers often use diverging

conceptual and theoretical frameworks, thus contributing to the immense expanse of different approaches to studying the interaction between individuals and new media, such as Facebook. To guide the understanding of available literature about SNS the researcher chose to use the Self as a basis from which to examine the interaction between Facebook and young adults.

1.1 Objective

Against this background, this study aimed to explore and describe the experiences of young adults regarding Facebook. This was done through semi-structured individual interviews with participants. The broad goal of this study was to generate knowledge and enhance understanding about this field in a South African context.

2. Research Methodology

A literature review revealed limited information regarding this topic. Qualitative research seeks to construct knowledge and aims to enhance understanding. A qualitative approach was considered the best strategy to be used for this research as the intention of this study was to identify common themes amongst the various semi-structured interviews in order to gain knowledge and an in-depth understanding regarding the experiences of young adults utilising Facebook. In qualitative studies the aim is not to be representative of the population, but rather to generate meaningful insights into the cases selected. Qualitative research offers the researcher the ability to explore the meaning within a range of social phenomena and requires the researcher to become immersed in the data in order to discover themes, generalizations and motifs (Neumann, 2003). Qualitative research designs do not require a set theoretical framework, such as in quantitative research. Using a predetermined theoretical framework may distort rather than shed light on human behaviour.

This study used a phenomenological research design that is descriptive yet analytical in nature (Miller & Salkind, 2002). The design focuses on the words, sentences and impressions provided by the participants (Neuman, 2003). The methodology of a phenomenological study does not include chronological techniques but includes an understanding of processes which are used to guide and plan the investigation of the phenomenon. The application of prescribed techniques within such a study could reduce the integrity of the actual phenomenon (Groenewald, 2004). Phenomenology focuses on description and interpretation more than upon analysis and measurement of a phenomenon as it emphasises subjectivity above objectivity. The focal point includes individual's feelings or meanings as well as their attitudes and beliefs. Therefore phenomenology aims to describe and interpret how individuals perceive things, understand situations and interpret various occurrences rather than to explain causality (Denscombe, 2003).

A transcendental approach was used in the present study to actualise the researcher's goal of observing, understanding and reflecting the phenomenon as it is perceived by the participants (Miller & Salkind, 2002). Transcendental phenomenology founded by Moustakas (1994) provides an organized methodology for analysing participants' lived experiences. This approach depends on the individual's experiences and relates their stories in their own words, thus giving in-depth and textural descriptions which is well suited to human science research. Transcendental phenomenology provides a systematic approach with processes clearly identified by Moustakas (1994). The researcher applied the four phenomenological processes namely, epoche, phenomenological reduction, imaginative variation and synthesis of meaning to provide a detailed description of the participants' experiences of Facebook (Moustakas, 1994).

The non-probability sampling strategy of purposive sampling was utilised to enable the researcher to find participants to be included in the sample in accordance with the exploratory nature of the research outlined. The participants consisted of seven young adults living in the Nelson Mandela Metropole. Six of the participants were female, and one was male. The participants of the study were between the ages of 22 and 28, attend university, and are all fluent in English.

Participants were invited to participate on a voluntary basis and were included in the study irrespective of race, culture, gender and socio-economic status. Potential participants had to use Facebook at least once a week and be willing to answer questions honestly during the interview. The semi-structured interviews were conducted in English or Afrikaans depending on the participants' preference. These questions were not prescriptive in nature as it allowed each participant to control the flow of conversation. To establish rapport between the researcher and the participants, general conversation was engaged in before the interviews commenced. The duration of the interviews ranged from 40 minutes to 1 hour and 24 minutes. The total time of the interviews was 6 hours 43 minutes 38 seconds.

The first participant for the study was identified, approached, and asked to suggest to the researcher other potential participants. The researcher continued with this process until a sufficient number of participants for the sample had been identified (Baker, 1988). The researcher interviewed participants until data saturation had been reached. The researcher

knew that data saturation had been reached when the same information was repeatedly expressed and the researcher no longer learnt anything new (De Vos et al., 2005).

The data processing and analysis was conducted in accordance with the principles and guidelines of transcendental phenomenological research. The data was analysed using Tesch's (1990) thematic content analysis, which involves patterns and theme recognition within the data. Lincoln and Guba's (1985) model was used to assess the trustworthiness of the data obtained.

3. Literature Review

The Internet as a tool for communication has revolutionized the way individuals all over the world communicate with each other. It is easier today to be connected to one another than ever before in history. Many scholars from a wide variety of different fields have studied SNS in an attempt to understand their application, implications and practices. boyd and Ellison (2008) define social networking sites as follows:

...web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site (p.211).

Over the past few years there has been a tremendous growth and rise in popularity of social networking sites across all age ranges (Joinson, 2003). The focus of this study was the social networking site Facebook which is one of the most popular networking sites among university students and has become part of individuals' social interactions. In the next section the researcher will review research that is directly concerned with SNS and more specifically Facebook, which in turn will set the stage for the present study. The following domains will be discussed namely, the self in psychology and impression management on social networking sites.

3.1 The Self in Psychology

The self and identity have been important concepts in the field of social psychology since the first part of the 19th century (Cook, Fine, & House, 1995). Scholars who examine human lives and experiences often view issues of the self and identity as significant when explaining human behaviour. The current mediated world challenges assumptions about the self. It is important to understand how mediated communication shapes the experience of self in an online setting (Miller, 2011). The potential for exploring the ever-changing dimensions of the self-social world relationship is immense. For the purpose of this study the self and its impact on online social networking behaviour was explored. "This continuing fascination with the self-concept is easy to understand: what we think about ourselves is probably the central concept in our conscious lives" (Fleming & Watts, 1980, p. 921). It is valuable to acknowledge the interactions of the self with others especially in light of the present research study. Individuals often describe themselves in terms of their relationships or the social roles they fulfill (Baumeister & Twenge, 2003). Therefore it is of great importance that one considers the self-social world interactions and the implications for one's self when studying the Facebook experiences of individuals.

3.2 Impression management on social networking sites

Social networking sites can be seen as providing a new way to access the self as an object by providing multiple opportunities for selective self-presentation. While identity formation in anonymous, online environments has been the focus of research for the past decade, more recently, the focus has shifted to self-presentation on social networking Web sites (Mehdizadeh, 2010). Research suggests that users of SNS engage in self-presentation behaviours to influence the impressions others form of them both face-to-face and in computer-mediated environments (Rosenberg & Egbert, 2011). Friendship links, or 'public displays of connection,' are significant aspects of self-presentation on SNS (boyd & Ellison, 2008). Some individuals may use the Internet as a means through which they express their true selves, possibly more than in face-to-face interactions (Bargh et al., 2002). For this reason one should consider that some individuals may not be engaging in impression management, but rather are able to express themselves to a greater extent on Facebook. Young adults are the most enthusiastic online reputation managers. Forty four percent of young adults limit the quantity of

personal information accessible about them, 47% of young adults have previously deleted unwanted comments others have posted on their profiles, and 41% have removed their names from photos posted by others (Madden & Smith, 2010).

While Facebook encourages its users to provide truthful information about themselves when creating their profiles, SNS offers the perfect setting for an individual to participate in self-presentational behaviour such as impression management as they are highly controlled environments (Mehdizadeh, 2010). It is clear that individuals want to present themselves in a favourable manner, but it is often a fine line between favourability and believability. Facebook offers an authentic online setting and relationships are often carried over from off-line interactions, therefore there are definite limitations to the identity claims an individual can make. However, Facebook still offers the ideal space for the 'hoped-for possible self' to be expressed. This is an indication of the realistic socially desirable self a person may try to establish (Mehdizadeh, 2010). The extent to which an individual is concerned with how others perceive them is likely to determine what information they choose to share on their Facebook profile (Zwier, Araujo, Boukes & Willemsen, 2011). Self-esteem can be directly linked to self-presentational patterns. Individuals who have high self-esteem are more likely to want approval from their social group. Impression management plays an important role in all interpersonal behaviour both off-line and online.

4. Findings and Discussion

The findings of this qualitative analysis will be discussed in the following section. The main themes that emerged from the research were Communication, Interpersonal relationships, Uses, SNS Addiction, The Self-Concept, and Privacy.

4.1 Communication and Interpersonal Relationships

The participants in the current study reported that they generally used Facebook as a means to communicate and stay up to date with friends, keep in touch with family, organise events, share information, post on other individuals' walls, message friends, read other's profiles, and post pictures. All of the activities centred on connecting with individuals for the purpose of staying in touch. One participant said: *"So that has changed communication in a sense that in the evenings I might be chatting to someone, in the past it could have been during the day more often. Like I say, aiding communication.... Some of the times that I've met up with people is through Facebook, for example through school friends that I haven't seen for five years..."* All of the participants in the present study reported that Facebook was an inexpensive, convenient communication medium, which could connect them to anyone anywhere in the world. Facebook offers many communications opportunities which assist individuals in maintaining their relationships. Facebook users have more control over their online communication by being selective about what they include in messages and how they phrase their messages. The participants expressed that they would censor themselves to an extent on Facebook, because they did not feel comfortable sharing very personal feelings and opinions in such an open way. One participant stated that: *"it's one of those where you try and fit in, so you won't say how you truly feel unless that person is very close to you, but that will be more on a personal level, face-to-face or over a phone call, but not on Facebook."* According to Lenhart et al. (2005) students' patterns of communication and perceptions of themselves and others both online and offline have been changed by SNS. This is due to the fact that many university students' lives have an online component. Carlyne and Kujath (2011) in their study of Facebook and MySpace confirmed that they both act as extensions of face-to-face interactions, but that some individuals tend to rely more on these social networking sites than on face-to-face interaction.

The findings of this study indicate that online communication is changing students' patterns of communication and perceptions of themselves. In general the participants expressed that they found Facebook communication to be limiting due to the lack of non-verbal cues, such as body language and voice tone.

4.2 SNS Use

Baltaretu and Balaban (2010) in their study attempted to determine what incentives motivate individuals' use of SNS. They found these incentives to be psychological in nature and related to interpersonal relationships and communication, socialization and group belonging. A participant in the present study reported the following about what she used Facebook for: *"I only upload pictures and status updates, but other than that you have apps that you can play games on and things like that, but I don't really do that."* One participant described Facebook as being a communication tool: *"I think Facebook is a very useful tool if you have maybe family or friends in another country or in another place like Pretoria or Cape Town and I like to keep in contact with them."* Another participant reported the following: *"I play online games on Facebook. ... there is Tetris, and that is like my favourite game."* She also said the following: *"...mostly I like go on like if it is between classes and there is nothing to do I will just scroll down, you know, look at people's profiles, their pictures."* From the present study it is clear that the participants use Facebook for several different purposes such as keeping in touch with others, networking, sharing information, accessing information, entertainment, passing time and interpersonal surveillance. The findings from the present study align with what other researchers have found to be motives for internet use namely; interpersonal connection, passing of time, information gathering, professional networking and entertainment (Baltaretu & Balaban, 2010; Papacharissi & Mendelson, 2011; Papacharissi & Rubin, 2000; Sheldon, 2008).

4.3 Addiction

Internet addiction can be defined by either an irresistible preoccupation or excessive use of the Internet for longer periods at a time (Shapira, Lessig, Goldsmith, Szabo, Lazoritz and Gold, 2003). The first empirical investigation into excessive internet use was completed by Young (1996). The study addressed the question of whether or not the internet had the potential to be addictive, and the extent of complications associated with its misuse. The findings indicated that dependent individuals spent more time online (38.5 hours per week) compared to non dependents (4.9 hours per week). Based on research conducted by Young (1996) and Shapira, et. al (2003), Internet addiction was classified as an impulse control disorder (Ko, Yen, Yen, Chen & Chen, 2010). Further research into the area of problematic Internet use followed quickly and defined Internet addiction as a behavioural addiction (Ko, et.al, 2010). Disagreement still exists regarding the diagnostic criteria of Internet addiction, therefore making accurate research into the prevalence of problematic Internet use impossible (Aboujaoude, Koran, Gamel, Large & Serpe, 2006).

Since Facebook allows individuals to express their ideal self which can be very satisfying and personally rewarding, behaviour reinforcement is a real possibility. When asked whether or not she thought Facebook was addictive one participant said: *“Oh yes, I think I’m a victim of Facebook addiction. When I am bored I go onto Facebook, at night before I go to bed I kind of just scroll through, it’s a habit.”* Another participant mentioned: *“I do spend a lot of time on Facebook. But I’m not... I’m one of those Facebook addicts, but not too addicted that I can’t live without it.”*

Young (1999) maintains that there are five different types of internet addiction, namely computer addiction, information overload, net compulsions, cybersexual addiction and cyber-relationship addiction. It would appear as though SNS addiction could fall under cyber-relationship addiction, because the primary goal of SNS is to help individuals build and maintain relationships. Kuss and Griffiths (2011) state that when examining addiction to Facebook from a clinical psychologist’s perspective, it could be categorized as a ‘Facebook Addiction Disorder’ or more broadly ‘SNS Addiction Disorder’. Young (1999) asserts that some individuals who use SNS excessively may present with addiction symptoms which impact on their personal and professional lives in the form of mental obsession, mood enhancing occurrences, tolerance, hiding of addictive behaviour, and using SNS for escapism. Zuckerman (1979) describes sensation seeking as the willingness to take risks in the pursuit of new and varied experiences that simulate sensations. Being a sensation-seeker may predispose an individual to addiction. Armstrong et al. (2000) found that high sensation-seekers showed more signs of addictive Internet behaviours than low sensation-seekers.

Griffiths (2005) views SNS addiction from a biopsychosocial standpoint and argues that SNS addiction, just like substance-related addictions, includes the experience of the ‘classic’ addiction symptoms. Taking the biopsychosocial model for the etiology of addictions and the syndrome model of addiction into account, scholars assert that individuals with SNS addiction will experience similar symptoms to individuals with substance addiction (Griffiths, 2005; Shaffer et al., 2004). This has important repercussions for clinical practice because the aim of treating SNS addiction will have to be on controlled use, rather than complete avoidance, due to the fact that SNS have become part of one’s daily life. There is currently no accepted set of criteria for Internet addiction or SNS addiction, therefore making the diagnosis and treatment very difficult.

Kuss and Griffiths (2011) recommend that further research be conducted to determine specific SNS addiction symptoms. They suggest adapting the criteria for substance dependence from the Diagnostic and Statistical Manual of Mental Disorders (DSM). The Diagnostic and Statistical Manual of Mental Disorders (DSM) has been one widely used source for identifying indicators of addiction. The DSM-5 (American Psychiatric Association, 2013) has not yet recognized Internet addiction as a disorder, but has listed Internet gaming disorder under section III, Conditions for further study. The American Psychiatric Association’s commendation suggest the value of further research to determine whether Internet addiction can or should be classified as another type of addiction, as proposed by some researchers.

It is the researcher’s opinion that the topic of Internet addiction and more specifically SNS addiction is a relevant and topical research field. In the researcher’s own experience Facebook use can easily become habitual and definitely has the potential to be addictive. It is clear that there is a great need for further research into the phenomenon of habitual and addictive Internet and specifically, SNS behaviour. The impact of their habitual Facebook use and the extent to which it has an impact on their personal and social lives was not clear. The treatment of online addiction is very challenging as absolute abstinence is virtually impossible due to the fact that individuals’ lives have such a big online component. The participants in the study all mentioned that their Facebook use has become a habit and some even classified themselves as ‘Facebook addicts’.

The researcher asked participants what they thought contributed to their habitual Facebook usage. One participant said the following: *“And people get a thrill out of, I mean, stalking, I can see why stalking would be addictive. Because I like looking at other people’s things you know, or checking up...what is going on. I don’t know why I want to do that, I don’t care about any of them, so it is a crazy phenomenon it makes no sense.”* The kind of ‘stalking’ behaviour the participants said they engage in usually included looking at the profiles of individuals and looking at what information they post on their profile as well as looking at their photographs. These behaviours seem to be linked to lesser forms of cyber-obsessional pursuit (Spitzberg & Rhea, 1999). In the researcher’s opinion, Facebook has popularised stalker-like behaviour amongst its user and made it exceptionally easy to monitor anyone without them knowing. The participants had all had experiences on Facebook of cyber harassment, either personally or having witnessed it. They experience that individuals sometimes use Facebook to stalk or harass others, but none of the participant knew whether or not they have been stalked on Facebook themselves. Most participants admitted to engaging in stalker-like behaviour on Facebook, often spending their time on Facebook browsing through the profiles of other individuals to gain information or simply for entertainment purposes. According to Spitzberg and Rhea (1999) this sort of behaviour can be related to interpersonal monitoring and surveillance which is consistent with lower forms of obsessive relational intrusion. The potential for obsessive relational intrusion and thus cyber-obsessional pursuit is very real on Facebook. It is the researcher’s opinion that almost all Facebook users associate watching other individuals and being watched as a fundamental part of the Facebook experience and users often adjust what they display on their profiles accordingly, by monitoring their online presence for content that they believed others could find offensive.

4.4 Self-concept

The mediated world of Facebook shapes the experience of the self online. The self-social world interaction on Facebook has implications for the participants’ expression of self and self-presentational behaviour. Interpersonal experiences directly impacts of the individual’s sense of self (Shaffer, 1994). Some of the participants felt that the presence of family and parents online restricted them in what they could post on Facebook. This suggests that participants consciously choose what aspects of their identity to share with others and what to keep hidden. The participants expressed that Facebook plays a very important role in helping them maintain relationships with individuals who live far from them, such as family overseas. Some participants highlighted how Facebook could potentially cause problems in relationships, especially in romantic relationships. This seemed to be linked to the possibility of romantic partners accessing archival Facebook information about them. Archival information about the user is accessible to any of their Facebook ‘friends’, and can therefore contribute to how they are perceived by others.

Participants disclosed that they carefully consider what they post on Facebook, suggesting a strong link with their need to control the expression of their identity on Facebook. The participants experienced Facebook as impacting on their identity and self-esteem and told of how they compare themselves to their Facebook ‘friends’. One participant said that: *“I think Facebook can be a huge threat to your self-esteem. ...I didn’t think it would affect me and it does.... I am still able to rationalise with those thoughts though, but someone who has a low self-esteem, it could really do damage...”* Another participant stated that: *“...if you put a picture on there and everyone like says ‘oh yes you look so pretty’ and you know that obviously is going to you know, increase your self-esteem.”* Participants attempt to display themselves in as favourable a manner as possible, always aware of how others may perceive them. One participant related the following: *“...people put their best pictures on, they always write like happy statuses, so maybe they are trying to create like a better person or like a more positive person than what they are.”* Another participant mentioned the following about her Facebook profile: *“It’s sort of is the real me, but only part of me, it could be a more positive side because in a sense I am more conscious of what I put on Facebook... I am concerned about what people think about me, so I want to give some sort of positive picture.”* From the above responses it is clear that the participants actively engage in impression management as they seem to realise that the impressions the give off will not only influence their online identity, but will most likely spill over into real life, making the control of information about themselves more complicated than first anticipated. The present study’s findings indicate that individuals engage in social comparison on Facebook and interpretation of their social interactions. Therefore the social interactions individuals engage in on Facebook can have a major impact on their self-esteem.

4.5 Privacy

Privacy has become a growing concern in everyday life. It has become increasingly easy to access information, store it and potentially share it through the use of computers and the internet. The term privacy has numerous meanings. In the media the focus has been largely on personal security; however the concept of privacy is much broader, with associations

to personal secrets and intimacy. Research findings indicate that concepts such as public and private in the context of computer-mediated communication is neither simple nor straightforward. Gefter (2007) asserts that the distinction between real life and online life is no longer clear-cut as individuals making up online and offline interactions are largely the same. Divisions between online and offline social activity are not necessarily evident in contexts such as Facebook. The participants highlighted their concerns with regards to the limitations to privacy and potential threats they have encountered on Facebook. One participant noted that: *“I’ve heard of someone that posted a picture or series of pictures of themselves on Facebook in their underwear and they were actually found on porn sites, so...”*

Researchers have explored the potential privacy risks associated with SNS, many of whom have focused on the safety of younger users (boyd & Ellison, 2008). Relatively little research has been conducted into how young adults understand the concepts of public and privacy on Facebook. Concepts such as public and private have been changed by SNS as there appears to be no clear division between private and public (West et al., 2009). According to West et al. (2009) SNS users view Facebook as both public and private. Adolescents’ opinions of privacy appear to be connected to their ability to control what others know about them (Livingstone, 2008). Although SNS offer enhanced social interaction, they also carry the risk of distributing a user’s private information to third parties.

In Gross and Acquisti’s (2005) study of privacy and SNS they found that users are often completely unaware of the amount of personal information they disclose and even though they usually share personal information in small harmless portions, the potential exists that the information can be connected and used in a privacy attack. Information privacy directly aligns with the protection of human rights and human dignity, affording individuals the capability to think and disagree freely without the risk of being monitored (Clarke, 2006a). Information privacy has been studied from various different perspectives including a human rights standpoint (Cavoukian, 1999; Clarke, 2006b), an information systems view (Clarke 1999), and an economic perspective (De Boni & Prigmore, 2001). It is clear that the concept of privacy is not easily defined and understood.

Human security is a human right that can potentially be violated by others through Facebook. Aggressors may use Facebook to plan or initiate an attack on someone. Individuals may face all kinds of attacks on Facebook including stalking, harassment, and defamation of character. According to Ellison and boyd (2008) there has been an increase in concern regarding the safety of children on SNS. The age limit for Facebook is 13 years, however when the South African Bill of Rights refers to minors it refers to children under the age of 18 years. Minors on Facebook could face an increased risk of abuse, bullying and exposure to explicit and harmful content.

According to Rainie, Lenhart and Smith (2012) adults reported more positive experiences on SNS than adolescents, suggesting that adult users are more inclined to ignore negative or offensive content and behaviour, and that adults are less likely to become involved in the harassment of other individuals on social networking sites than teens. Rainie et al. (2012) found that 45% of their adult survey participants had previously decided not to post something online owing to concerns about how it could reflect on them.

Several potential employers see importance in making use of social networking sites and internet search engines as part of their screening and background search of candidates. In recent times, concerns regarding how individuals use SNS have started to attract attention. Individuals are increasingly using SNS for the surveillance of others (Tokunaga, 2011). The core purpose of the majority of social networking sites is to help individuals connect to others with whom they already have an offline relationship with (Lampe, Ellison, & Steinfeld, 2006).

According to Lampe et al. (2006) ‘social searching’ is one of the major incentives for Facebook use. Facebook has been linked to increased romantic jealousy and surveillance of partners (Melander, 2010). The risk of information exploitation is increased through Facebook especially if an individual’s personal information can be accessed by a wider audience. According to Lyndon, Bonds-Raacke and Cratty (2011) young adults often participate in stalker-like behavior. These behaviours mostly do not meet the legally required standard of causing their victims fear. Facebook may facilitate stalking behaviours, which in turn has implications for individuals’ privacy and security. Facebook has led to the development of several new words such as ‘Facebook stalking’ and ‘Stalkbook’. While these words may not refer to the traditional idea of stalking they may form part of less severe behaviours that are termed obsessive relational intrusion (ORI) (Lyndon et al., 2011). ORI overlaps with stalking and can be defined as “the repeated and unwanted pursuit of intimacy through violation of physical and/or symbolic privacy” (Cupach & Spitzberg, 2000, p. 66). Spitzberg and Hoobler (2002) created the term cyber-obsessional pursuit (COP) for the online version of obsessive relational intrusion. These types of behaviour can be associated with interpersonal monitoring and surveillance which is consistent with lesser forms of obsessive relational intrusion, as well as cyber harassing and demanding intimacy from another individual (Spitzberg & Rhea, 1999).

The ending of a romantic relationship may trigger ORI behaviours, with 99% of university students admitting to engaging in some form of ORI after breaking up with a romantic partner (Dutton & Winstead, 2006). The potential exists that COP may develop into cyberstalking if the behaviours are severe enough to cause a reasonable person fear. Facebook stalking has not yet been extensively researched. There are no studies examining the perpetrator's motivations for ORI, COP or Facebook stalking (Lyndon et al., 2011). Cyber-obsessional pursuit (COP) may include covert behaviours such as passively browsing through profiles or overt behaviours such as posting negative comment or embarrassing photographs. Individuals' private lives become public on Facebook, which is related to cyber harassment (Lyndon et al., 2011).

On Facebook a stalker can easily observe what information their victim publishes and use the information to determine the victim's physical location. Specific applications on Facebook makes anonymous stalking of another person very easy, these functions include the Facebook 'Chat' feature and the 'Check In' feature, all of which provide stalkers with information about their victim's whereabouts. There is a very real threat of cyber-obsessional pursuit on SNS such as Facebook, therefore there is a need for cyberstalking laws as well as cyber harassment laws specifically aimed at regulating these crimes. Increased Facebook popularity raises concerns about personal privacy and safety as individuals become more exposed to potential privacy threats on SNS.

The results of this study have been presented according to the key areas that have emerged through the conversations with participants. The results illustrate the participants' experiences of Facebook. Participants experience that Facebook contributes greatly to the development and maintenance of interpersonal relationships, however they also highlighted perceived disadvantages and limitations to Facebook communication. Participants' motives for Facebook usage were many and diverse, including relationship maintenance, professional networking, information gathering, social searching and 'Facebook stalking' of others, entertainment and passing of time.

5. Limitations

The limitations of the current research study will be discussed in order to suggest improvements for future research. The present study aimed to broadly explore the Facebook experiences of young adults.

The first limitation of this study is that it is an exploration of the experiences of young adults on Facebook. A narrower research focus on one or two themes relating to this research may produce a clearer and more in-depth description. Secondly, the sample size of this study was small and consisted of a total of seven participants. While being able to portray the experiences of the participants and identify common themes, the findings are not representative of young South African adults as a whole. Thirdly, the research findings of the present study cannot be generalised to the larger population, as the sample isn't representative of the larger population. Non-probability sampling was employed which meant that the participants were purposefully selected, therefore the possibility of researcher bias exists. Fourthly, limited research and available literature were also considered a limitation to this study. Literature involving the Facebook experiences of young South African adults was severely lacking.

6. Recommendations for Future Research Studies

With the scarcity of academic literature on young South African adults' experiences of Facebook, the present study provides some valuable findings while at the same time highlighting possibilities for future research. It is recommended by the researcher that more research be conducted with regards to this topic and related issues in this field specifically on South African young adults. There are numerous areas of an individual's life that is impacted upon by SNS and which could benefit from further in-depth investigation. One of the themes that emerged throughout the research was the habitual nature of Facebook. There is a need for further studies in this area of SNS addiction, such studies can contribute to the development of and the understanding of cyber addiction. Another potential topic for research is the impact of cyber harassment, specifically on the self-esteem of the victims, as all of the participants reported that they had witnessed or experienced harassment on Facebook. A more comprehensive examination of the motivations behind Facebook harassment, along with interpersonal surveillance and stalking is also recommended. It is suggested that future research explore the actual differences in gender with regards to Facebook usage. Research on attention-seeking behaviour on Facebook is another recommended topic for further study. As researchers move forward in understanding the ways individuals interact with one another in online social networking environments, these are some of the research areas that will benefit from further investigation.

7. References

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Perceptions of Online Infidelity

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Abstract

There has been a large amount of research on infidelity and its effects on relationships. However, a new phenomenon, that of online infidelity, has emerged and with it comes some confusion as to what exactly constitutes an act of infidelity while exploring the limits of cyberspace. While some research has been done internationally on the perceptions of online infidelity, studies conducted in South Africa are lacking. This presentation reviews the literature on people's perceptions of online infidelity. Both international and national literatures were reviewed. It has been found that there are a wide variety of differing results with regards to studies that focus on what constitutes online infidelity. These results emphasize the current lack of consensus as to what online infidelity explicitly entails. Themes include the following: emotional infidelity, sexual infidelity and pornography.

Keywords

Infidelity, Perceptions, Internet infidelity, Cyber-affairs, Cyber-cheating, Online Infidelity

1. 1. Introduction

Infidelity is one of the most damaging events that can happen within a relationship. It is a common reason for divorce in a number of cultures (Amato & Rogers, 1997). While the idea of exclusivity is one of the main components of a relationship (Trias & Geason, 2000), there is a surprisingly large amount of people that do not adhere to this norm. In Wiederman and Hurd's (1999) study of university relationships, it was found that 68% of women and 75% of men had taken part in some form of infidelity while in a committed relationship. In another study conducted in 53 countries with nearly 17,000 participants, it was found that 63% of men and 45% of women reported having sex with someone outside of the relationship (Schmitt *et al.*, 2004). Infidelity is commonly thought of as the act of having an extra dyadic sexual affair. However, it can also include an emotional connection to someone outside of the primary relationship (Eaves & Smith, 2007). There are a number of factors that can explain why infidelity takes place. Relationship dissatisfaction, boredom, and lack of emotional support from partners have all been found to contribute to engagement in infidelity (Thompson, 1983; Allen *et al.*, 2005).

2.

3. 2. Objective

The objective of this study is to describe and explore the different perceptions of online infidelity by means of a literature review of online infidelity literature from 1990 to 2013. Due to the current lack of understanding there is ambiguity for both therapists and clients surrounding the topic of online infidelity. Furthermore, the serious nature of online infidelity (which may be comparable to offline infidelity), means that research into this topic is of importance at present. These issues are explored more fully in subsequent sections.

4. 3. Research Methodology

The methodology that the reviewer used is that of a literature review. A literature review was seen as appropriate to use for this study because many international studies have found several disparate findings on the perceptions of online infidelity. Substantial uncertainty therefore exists with regard to definitions regarding what constitutes online infidelity. The reviewer did not explore a substantive question for this study, as the aim of this study is only to describe and explore the perceptions of online infidelity by means of a literature review, not to compare variables or constructs. The data that the reviewer sampled were articles in scholarly journals, books, theses and computerized databases. In order not to limit the study, the reviewer used both quantitative and qualitative studies. Given the limited amount of such studies done in South Africa, the reviewer used both international and national search strategies. The reviewer used certain criteria to select relevant articles. All articles needed to contain information about online infidelity, specifically people's perceptions

of what online infidelity is. Articles included information about both men and women's perceptions. The reviewer only considered studies done after 1990 and reviewed as many reports as was possible.

5. 4. Context of the research

The internet has become a popular way of connecting and interacting with others. As a fairly recent technological development with its own social interaction dynamics, there has been growing confusion as to what constitutes inappropriate communication or behaviour for those within relationships when using this medium to interact with others. While much research has been done on the perceptions of offline infidelity, research into the perceptions of online infidelity is fairly new, and many of the findings are contradictory. As a result, therapists struggle with the definition of internet infidelity and cannot agree on its treatment (Nelson *et al.*, 2005). As our brain registers virtual and physical acts in the same manner (Mathiak & Weber, 2006), it can be argued that online infidelity produces the same effects as that of offline infidelity, making the perception of such an event a possible pitfall for harmonious relationships. This is due to the fact that infidelity is one of the leading causes of the termination of a relationship (Amato & Rogers, 1997). For these reasons, research into the perceptions of online infidelity appears to be important at present.

6. 5. Results and Discussion

7. 5.1 Introduction

This section focuses on the results and discussion of the findings of current studies on the perceptions of online infidelity. With regards to perceptions of online infidelity, a number of different themes emerged within the results of the studies reviewed. These themes include that of emotional infidelity, sexual infidelity, pornography use, and gender differences in perceptions of online infidelity.

8. 5.2 Emotional Infidelity

The first theme to be examined is that of emotional infidelity; wherein one partner within a relationship forms an intimate emotional connection with someone outside of the primary relationship. Emotional infidelity behaviours fall outside the sexual spectrum and can include behaviours such as flirting, dating, spending time together, and falling in love with someone other than one's partner (Roscoe *et al.*, 1988). Seven studies found that forming emotional connections with another person online was viewed as infidelity by participants (Docan-Morgan & Docan, 2007; Groothof *et al.*, 2009; Guadagno & Sagarin, 2010; Helsper & Whitty, 2010; Henline *et al.*, 2007; Knight, 2010; Whitty, 2005). Docan-Morgan and Docan (2007) categorised online infidelity into two different types, based on their findings; Superficial/informal behaviour and goal directed/involving behaviour. For example, Docan-Morgan and Docan (2007) found that "sharing secrets, expressing care, flirting, and communicating before bed every night were viewed as considerable degrees of infidelity" (P.331). The goal directed and involved nature of these acts may explain why participants may feel that these behaviours are classified as infidelity as opposed to say, a philosophical discussion about love. Interestingly, Guadagno and Sagarin (2010) found that participants in their study experienced online infidelity behaviours as less severe than conventional infidelity, unless the online behaviours were emotional behaviours. The authors theorise that this is because of three concepts. The anonymity, accessibility and affordability of internet use, as described by the Triple A model (Cooper & Griffin-Shelley, 2002) allows for online infidelity to be participated in with relative ease compared to its conventional counterpart. Anonymity describes the ability of individuals to completely hide their identity online, allowing for more freedom online, possibly without their partners' knowledge. Accessibility describes how the internet can be accessed from a number of locations. Affordability allows individuals more opportunities to engage in infidelity behaviours, as membership of a website can be much cheaper than funding an offline romance. Tying this concept into that of Docan-Morgan and Docan's (2007) concept of goal directed/involving behaviour can explain how emotional infidelity behaviours can be viewed with the same or more severity as conventional emotional infidelity. Similarly, a majority of participants within Henline *et al.* (2007) found that emotional online infidelity was perceived as more distressing than online sexual infidelity. Uncertainty-reduction theory states that one of the major goals of relationship formation is the reduction of uncertainty between two partners (Berger & Calabrese, 1975). As the internet lacks many of the nuances of offline communication, such as physical cues, participants are far more likely to use emotional self-disclosure as a way of reducing this uncertainty, which can lead to faster development of intimacy. This could explain why emotional online infidelity is viewed as distressing. Another related theory is that internet users can subjectively feel much less inhibited than they would in an offline context, which would encourage them to be more open about themselves,

accelerating intimacy. This increased intimacy could be experienced as very rewarding for those involved in an emotional online affair (Young *et al.*, 2000). Henline *et al.* (2007) posit that as emotional behaviours online are fairly similar to offline emotional infidelity behaviours, emotional online infidelity can easily be viewed with the same severity as that of offline infidelity. The implication of attachment to an online counterpart also contributes to the negative perception of such behaviours. As partners within a relationship can often have different ideas as to what is classified as infidelity, it is interesting to note the results of Helsper and Whitty's (2010) survey, in which married couples were asked individually to rate which behaviours online are deemed unacceptable. Falling in love with someone else online was viewed by participants as a highly unacceptable behaviour. A similar discovery was made by Parker and Wampler (2003), who found that married couples tended to rate sexual behaviours online as more serious than other participants. Partners in marriages have been found to have similar values and behaviours (McLeod, 1993), and understanding the attitudes and expectations of a partner leads to higher marital adjustment (Ickes *et al.*, 2003). Henline *et al.* (2007) found that participants in their study perceived the likelihood of an online emotional affair leading to a real life affair as much higher than the likelihood of an online sexual affair leading to an offline sexual affair. Participants in this study showed a greater sense of distress at emotional behaviours online as opposed to sexual behaviours. This distress can be linked to the belief that emotional attachments are more likely to lead to offline meetings. This perception is likely due to the fact that emotional infidelity implies a level of attachment to an online partner that sexual behaviours may not. While it can be seen that many participants in the studies discussed rated emotional behaviours as infidelity, other studies found contrasting results. For example, Whitty (2003) discovered that participants did not view emotional connections established online as acts of infidelity, but instead focused more on sexual behaviours as acts of infidelity. In Whitty's (2005) qualitative study, it was found that participants on the whole viewed forming an emotional connection with someone else as a real act of betrayal. However, some of the participants argued that forming a virtual relationship does not constitute infidelity. These participants stated that this kind of relationship is not a threat and should only be understood as a friendship. Other justifications included that these relationships are with an object and not another person, or if there is no intention of meeting up with their online contacts offline, then it cannot be an affair. Knight (2010) found that talking to a romantic interest online is viewed by participants as infidelity. However, it was found that flirting with others online is not considered a form of infidelity. As can be seen, there seems to be a strong belief that online emotional infidelity exists and is a serious issue. Despite this, certain conflicting results indicate a level of confusion regarding which behaviours are classified as emotional infidelity.

9.

10. 5.3 Sexual Infidelity

Another aspect of online infidelity is that of sexual infidelity. With regards to online infidelity, sexual activity can include cyber-sex as well as porn use. However, porn will be considered an aspect on its own, separate to cyber-sex. In terms of cyber-sex, the majority of studies reviewed discovered that cyber-sex is a form of infidelity (Antolik & Zander, 2010; Docan-Morgan & Docan, 2007; Gaudagno & Sagarin, 2010; Groothof *et al.*, 2009; Hackathorn, 2009; Helsper & Whitty, 2010; Hackathorn & Harvey, 2011; Henline *et al.*, 2007; Knox *et al.*, 2008; Parker & Wampler, 2003; Wang & Hsiung, 2008; Whitty, 2003; Whitty, 2005). Parker and Wampler (2003) found that cyber-sex was rated as a problematic behaviour within their study. However, cyber-sex was rated as being less severe than an offline sexual affair, possibly due to the lack of physical contact between partners. Whitty's (2003) study focusing on men and women's attitudes towards online infidelity found that participants viewed cyber-sex as being as real and impactful as an offline sexual affair, despite the lack of physical contact. It is theorised that cyber-sex is viewed as threatening because it implies that one's partner has a desire for a sexual encounter outside of the relationship. Indeed, research has shown that a number of participants in cyber-sex activities have either expressed wishes to meet their online contacts offline, or have successfully continued sexual relationships within an offline context (Mileham, 2007; Whitty, 2003). Another possible explanation for cyber-sex being viewed as infidelity is that our brain registers both virtual and physical acts in the same way (Mathiak & Weber, 2006). As a result, online affairs are cognitively experienced the same way as offline affairs are. In Wang and Hsiung's (2008) study of Taiwanese college student's attitudes toward online infidelity, it was discovered that among their sample existed three clusters of attitudes towards both cyber-sex and emotional infidelity. One cluster comprised of individuals who believe that both sexual and emotional behaviours are unacceptable. Another cluster tended to rate all behaviours online as being acceptable. The last cluster rated emotional behaviours as acceptable, but sexual behaviours as unacceptable. Within Whitty's (2005) study, some participants justified that cyber-sex infidelity could not be viewed as infidelity if there is no desire to meet up with online partners in an offline context.

Interestingly, participants in studies that focused on the perceptions of active cyber-sex users had more accepting attitudes towards cyber-sex. Participants in Wang and Hsiung's (2008) study that had more online contacts or friends were less

likely to believe that cyber-sex constitutes infidelity. Those participants who had more experience with cyber-sex online were also more likely to view this behaviour as acceptable. This could be explained through the concept of acceptability. Acceptability states that the internet has a separate set of norms and rules than that of real life (King, 1999). This in effect means that relationships online can be viewed as less threatening to a real life relationship by those partaking in these activities, as virtual relationships and offline relationships take place in contexts with completely different rule sets. Similarly, the social identity/deindividuation model explains that online behaviours are dependant on existing norms and behaviours within cyberspace (Postmes *et al.*, 1998). Internet users are more likely to view online behaviours as acceptable because of an ingroup pressure to conform to prevailing norms. Participants in Mileham's (2007) study of cyber-sex users argued that cyber-sex does not breach any norms regarding relationship exclusivity. A similar finding arose in Cooper *et al.*'s (2002) study examining the demographics of cyber-sex users, wherein sixty percent of participants stated that cyber-sex does not break any vows of exclusivity. This could be explained by a concept known as behaviour rationalisation. This concept describes the justification of behaviours that could be classified as adultery, such as cyber-sex, by rationalizing that because there is no physical contact, it is not infidelity. Despite the fact that most participants in Mileham's (2007) study did not view their behaviours as infidelity, they still kept their online behaviours secret from their partners. As participants perceive that a lack of physical contact renders cyber-sex as a sexual fantasy, they do not believe it to be a threat. One reason for this perception lies in the theory that, when considering sexual fantasies, fantasies are more likely to be considered unfaithful when they are perceived as more threatening to the relationship (Yarab & Allgeier, 1998). While the majority of participants in Mileham's (2007) study did not view their behaviours as infidelity, seventeen percent of the sample perceived their own behaviour as infidelity. However, these participants also used behaviour rationalisation to excuse their behaviours by claiming that their cyber-sex activities are a lesser form of affair than traditional offline infidelity. Participants also claimed that by partaking in cyber-sex online, they were in fact aiding their marriage. This could be explained by the fact that individuals may use cyber-sex as an external method of coping with marital problems, rather than dealing with these issues with their partners. It was found in Docan-Morgan and Docan's (2007) study that participants were more likely to view their partner's hypothetical infidelities as more severe than their own hypothetical infidelities. Two possible theories that can explain these justifications are that of interdependence theory and need fulfillment. Interdependence theory states that partners compare their current relationship standards with that of perceived alternatives, and are more likely to prioritise their own needs over that of their partner's (Kelly & Thibaut, 1978). Need fulfillment states that partners seek to attain certain goals within a relationship. If these needs are not met adequately within the primary relationship, partners may be tempted to seek fulfillment of these needs in an extra dyadic relationship instead (Drigotas & Rusbult, 1992). Participants in both Mileham's (2007) and Docan-Morgan and Docan's (2007) study may compare aspects of their own relationships with that of their relationships online, and find that cyber-sex is a better alternative. In the same vein, needs of participants may not be being fulfilled within their primary relationship, allowing them to justify cyber-sex as a way of attaining these needs discretely without compromising the security of the primary relationship.

11. 5.4 Pornography

With regards to pornography, conflicting results have been found. Five studies found that participants did not view pornography as infidelity (Antolik & Zander, 2010; Bridges *et al.*, 2003; Guadagno & Sagarin, 2010; Parker & Wampler, 2003; Whitty, 2003), while two discovered that pornography was viewed by participants as constituting a form of infidelity (Bergner & Bridges, 2002; Docan-Morgan & Docan, 2007).

Bergner and Bridges' (2002) study focused on the significance of heavy pornography involvement for romantic partners. In this case, a theme of secrecy and deceit was found. Participants claimed that their pornography using partners were having a secret life from which they were excluded, and that their relationship was damaged by their partner's use of pornography. Bridges *et al.* (2003) focused on females' perceptions of their partners' use of pornography. It was found that while the majority of women in this study did not ascribe highly negative meanings to their partner's porn use, one third of the sample saw porn as a kind of betrayal. Participants viewed it as damaging to both the relationship intimacy as well as their own self-esteem. The authors state that "women will find pornography use distressing in the measure that they perceive that their partners have become heavily immersed in it, a factor that has likely implications both for their perception of losing him to the pornography and for their view of his sexual health or normalcy" (p.14). Based on these two studies, the authors claim that pornography usage is not viewed negatively by a majority of female partners and that only a minority view pornography usage as a highly damaging relational act. In line with this finding, as well as the findings of the above mentioned studies, Docan-Morgan & Docan (2007) also discovered that communication is not necessary at all for infidelity to be perceived. Behaviours such as posting and looking at personal ads, as well as pornography viewing were seen as infidelity, perhaps due to the involved nature of these acts. Despite negative perceptions of pornography use evident in these studies, it was largely found that participants in other studies did not view pornography

use as infidelity or as majorly damaging to relationships (Antolik & Zander, 2010; Bridges *et al.*, 2003; Guadagno & Sagarin, 2010; Parker & Wampler, 2003; Whitty, 2003). In this case, Yarab & Allgeier's (1998) theory applies. While pornography may give the viewer a greater visual rush than talking with a stranger, it can be perceived that partners watching pornography are far less likely to meet up with a porn star than with a stranger they have met on the internet (Whitty, 2003). As stated before by Bridges *et al.*, (2003) and linking with Docan-Morgan and Docan's (2007) theory of involving and goal directed behaviour, pornography use may be viewed as infidelity only in so far as it is perceived as an involving and goal directed act.

12. 5.5 Gender Differences

Studies mostly found that women were more likely than men to argue that online sexual and emotional behaviours constitute cheating (Guadagno & Sagarin, 2010; Docan-Morgan & Docan, 2007; Knox *et al.*, 2008; Parker & Wampler, 2003; Wang & Hsiung, 2008; Whitty, 2003).

In Docan-Morgan & Docan's (2007) study, it was found that women rated goal directed/involving acts, namely acts involving intimacy and relationship seeking, as being far more severe than men did. The evolutionary theory states that because men have a higher reproductive potential, they place less emphasis on caring for a mate and their offspring and more emphasis on finding new mates. By contrast, women place more importance on child rearing and protection and consider a stable partner more beneficial (Trivers, 1972). This could explain why women are more likely to consider certain behaviours as infidelity than men are. Studies found that men were more upset by a partner's online sexual infidelity and women were more upset by a partner's emotional infidelity (Groothof *et al.*, 2009; Guadagno & Sagarin, 2010; Whitty, 2005). This too can be explained through the evolutionary perspective. Symons (1979) argues that men and women's differing views on infidelity are based on reproductive challenges. Men are more likely to find sexual infidelity upsetting because they don't want to waste time raising another man's child when they could be seeking mating opportunities elsewhere. Women would find emotional infidelity more distressing because a man who is committed to another woman cannot provide for them and their offspring. While online sexual activities do not result in pregnancy, the brain registers virtual and offline events in the same way (Mathiak & Weber, 2006). In this way, the evolutionary explanation can still apply. The social cognitive perspective provides another reason as to why these gender differences exist in the online environment. The double-shot hypothesis states that when a woman learns of a man's emotional involvement with another woman, she assumes that he has already had sex with her. When a man hears of a woman's sexual involvement with another man, he assumes that she is in love with this man (Harris & Christenfeld, 1996). An interesting finding with regards to gender differences is found in Hackathorn and Harvey's (2011) study focusing on sexual double standards regarding online infidelity. It was found that males were more likely to perceive possible infidelity behaviours as infidelity when the perpetrator was female, and females were more likely to perceive infidelity when the perpetrator was male. In the same vein, the perception of the severity of the infidelity showed the same gender bias. The intergroup bias theory states that members of an in-group are more likely to view their own members favourably in comparison to members of an out-group (Brewer, 1979). In this case, males and females do not perceive infidelity when members of their own in-group display possible online infidelity behaviours as a protective function.

13. 5.6 Summary of Findings

As has been shown by current research, online infidelity can have a wide range of different meanings depending on relational partners' views. While perceptions of sexual infidelity had the most homogenous results, with the majority of participants viewing cyber-sex as a form of betrayal, emotional infidelity and studies concerning pornography usage had contrasting results. Indeed, those participants involved in possible infidelity behaviours did not necessarily view these behaviours as infidelity at all. Combined with the gender differences in perceptions of online infidelity, all these themes indicate that online infidelity is as real and impactful as that of offline infidelity. The current lack of studies on this topic, as well as the ambiguity surrounding some of the behaviours involved, suggest a need for more research on perceptions of online infidelity.

14. 6. Recommendations for Future Research Studies

Because of the current lack of comprehensive research into this topic, as well as a lack of a clear definition pertaining to the nature of what constitutes online infidelity, more research into this topic would appear to be beneficial for both theoretical and practical reasons. The ambiguity and differences found within each of the themes explored seem to highlight this need for further study. As such, future studies should aim to contribute to the development of the understanding of online infidelity, as well as the understanding of the myriad issues which cause confusion about what

should be classified as online infidelity. It is the authors' opinion that the creation of awareness surrounding the topic of perceptions of online infidelity can influence treatment plans in a positive manner as well. For clients, the knowledge of a lack of a concrete definition of online infidelity, may lead to a greater understanding of the reasons for the differences in how they and their partners view potential infidelity behaviours. As therapists may have their own perceptions of what constitutes infidelity in a virtual context, further research may assist them in clarifying and appropriately treating ambiguous cases in an objective fashion.

15. 7. References

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Impact of Mobile Phones on the Quality of Life of Disabled People

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Abstract

This paper investigates the impact which mobile phones have on the Quality of Life (QoL) of disabled people in Cape Town. Mobile technologies hold the potential to increase the freedoms and capabilities of their users, especially if these have been prevented by their disabilities from participating in the social, economic and political spheres. The research used a survey method. Respondents were asked to rate their perceptions of where mobile phones could impact and improve various aspects of their QoL. They were also queried on their actual use of these potentials. The research reports on both the perceptions and actual use, and maps these against demographic variables. The main finding is that mobile phones extend and enhance primarily various social opportunities, more than economic or political options.

Keywords

Mobile Technologies, Mobile Phone, Impact of ICTs, Disabled People, Quality of Life (QoL).

1. Introduction

The introduction and advancement of Information and Communications Technology (ICTs) has had far-reaching effects on how individuals live their daily lives. With ICTs, individuals are now able to communicate, gain access to information and perform various tasks in a more efficient manner (Aguilera, Guillot, & Rallet., 2012). Thanks to mobile phones, individuals can now perform, manage and complete various tasks anywhere at any time because of the ubiquitous nature of the mobile phone. Mobile phones have had a major effect on the various areas of individuals' lives such as in the social, health, economic and political domains (Claes, Van Hove, van Loon, Vandeveld, & Schallock, 2010).

The users of mobile phones are often considered in a broad manner which could potentially create the idea that they are all the same and have similar characteristics; this is not always the case. There are many marginalized groups of people who enjoy the benefits of mobile phones. These groups range from the disabled, old (Van Biljon, van Dyk, Gelderblom, 2010; Meador & Van Belle, 2014), and uneducated to the foreign migrant (Nyamarebvu & Van Belle), etc. (Toboso, 2011). Mobile phones have played a huge role in empowering the lives of these marginalized groups (Shankaraiah & Swamy, 2012; De Jager & Van Belle, 2014). However, little research has been done to describe the influence that ICTs or mobile phones have had on the overall quality of life of marginalized groups, or, more specifically, disabled people. In addition, not much research has covered the impact of mobile phones on the quality of life of disabled people in the context of South Africa.

The purpose of the research is to inspect the impact that mobile phones have on the overall quality of life of disabled people in Cape Town. Some of the questions the research seeks to address are:

- What factors do disabled people associate with quality of life?
- What impact do mobile phones have on the overall quality of life of disabled people in Cape Town?
- Are disabled people exploiting the various opportunities offered by mobile phones?
- Which factors challenge the adoption and accessibility of mobile phones by disabled people?
- How can mobile phones be used to empower the lives of disabled people?

The outcome of the research will provide insight into the perceived impact of mobile phones on the quality of life of disabled people in Cape Town. It will also provide insight into the aspects that challenge the adoption and usage of mobile phones by disabled people, and whether mobile phones can be used as a means of empowering disabled people. The results of the research could be beneficial to disabled people who are unaware of the benefits or challenges attached to the adoption and usage of mobile phones. In addition, the results could also benefit mobile phone and applications developers who may want to develop phones or applications that will accommodate and empower disabled people. Furthermore, the research

will also provide academic value since not much research has been done with regards to how ICTs contribute towards QoL.

2. Prior Research

Mobile Phones in South Africa

The mobile phone has been widely adopted in Africa. The core characteristics of mobile phones are ubiquity, convenience, reachability, localization of services and application, instant internet connectivity, and personalization (Joubert & Van Belle, 2013; Van Bilon, Kotzé & Renaud, 2008). According to Milosevic et al. (2013), calling and texting are no longer the primary purposes of mobile phones. Mobile phones now offer many more features that are similar to those that contributed to the popularity of personal computers. We can distinguish between feature phones and smart phones (Fernando, Dias, and Wijesekara, 2010). Feature phones are a second generation of mobile phones with features ranging from cameras, MMS, GPRS, 2G, medium processing and screen size. In addition, feature phones are able to run applications based on various platforms such as JAVA ME. Smartphones are a third generation of mobile phones with more advanced computing ability and better connectivity than feature phones (Fernando et al., 2010). Smartphones are able to run more advanced applications based on a specific platform such as Android, iOS, or Windows (Ogawa & Oikawa, 2012).

Statistics South Africa's General Household Survey (GHS) for 2011 reported on the ownership of telecommunications, grouped by province (Statistics South Africa, 2012). According to Statistics South Africa, the Western Cape has 86.5% adoption of cellular phones. The 86.5% consists of 54.3% of cellular phones plus 32.2% that consists of cellular phones as well as landline. This is a very important fact because the research is done in Cape Town in the Western Cape (Statistics South Africa, 2012).

The uptake of mobile phones by marginalised groups in South Africa has already been researched, particularly in the context of the aged (Renaud, Bignaut & Venter, 2013; Van Biljon, van Dyk, Gelderblom, 2010; Mealor & Van Belle, 2014) or migrants (Nyamarebvu & Van Belle, 2013). However, little is known about the use of mobile phones by the disabled.

Quality of Life

Quality of Life (QoL) is the overall satisfaction or well-being of an individual, considering various domains that influence the individual's life such as health, psychological state, social relations, personal beliefs and economic status (Susniene & Jurkauskas, 2009). Additionally, QoL can be considered as the goodness of one's life in view of the various aspects of one's life (AzizulHaq & Abdullah, 2012). QoL is the satisfaction of needs where satisfaction is the gap between aspiration and actual achievement. In its pure form, quality of life is the overall satisfaction of individuals with their current or actual life in comparison with their ideal life (Susniene & Jurkauskas, 2009).

A theory on the quality of life was put forward by Van Loon *et al.*, which suggests that quality of life is composed of eight core domains which are important for all people's overall well-being (Van Loon, Claes, Vandeveld, Van Hove & Schalock, 2010). These can be grouped into three quality of life factors which are interdependence, social participation and well-being. Furthermore, the eight core domains are broken down into indicators which are behaviours, conditions and perceptions that give an indication of an individual's personal well-being or satisfaction. Table 1 summarizes the quality of life conceptual and assessment framework (Van Loon et al., 2010).

QoL Factor	QoL Domain	Exemplary QoL Indicators
Independence	Personal Development	Education status, personal skills, adaptive behaviour
	Self-Determination	Choices/decisions, autonomy, personal control, personal goals
Social Participation	Interpersonal Relations	Social networks, friendships, social activities, relationships
	Social Inclusion	Community integration/participation, community roles
	Rights	Human (respect, dignity, equality), Legal (legal access, due process)
Well-Being	Emotional Well-Being	Safety and security, positive experiences, contentment, self-concept, lack of stress
	Physical Well-Being	Health status, nutritional status, recreation/physical exertion
	Material Well-Being	Financial status, employment status, housing status, possessions

Table 1: Quality of life conceptual and measurement framework (Van Loon et al., 2010).

Disability

Disability is a concept that is complex to define. Various models have been developed to define what disability is and how it is evaluated. The four major models of disability are the medical model, the social model, the Nagi model and the International Classification of Disability model (Mitra, 2006). We use the latter in this research, in part because it is the most objective to measure and also because it is the one adopted by Statistics South Africa. In 2010, Statistics South Africa adopted the disability framework developed by the Washington Group (Statistics South Africa, 2012). According to Madans et al. (2011), the overall objective of the Washington Group (WG) was to develop a framework that would eliminate the challenges faced when defining and measuring disability. The Washington Group's framework is standardized among all the United Nation member states; South Africa is one of the members (Madans et al., 2011). The WG uses the International Classification of Functioning (ICF) model as a technique of evaluating disability (Madans et al., 2011). According to Statistics South Africa (2012), disability is defined as “*Difficulties encountered in functioning due to body impairments or activity limitation, with or without assistive devices*” (p. 42).

The Washington Group's framework uses six key sets to identify people with disabilities (Madans et al., 2011; Statistics South Africa, 2012). The six sets are seeing, hearing, walking, communicating, self-care, and remembering and concentrating. The Statistics South Africa's General Household Survey (GHS) for 2011 puts the number of disabled people in South Africa at 2,330,000, or 5.2% of the total population. The Western Cape has a slightly lower proportion of disabled, averaging 4.4% for a total of 221,000; however, there is a gender bias since there are more disabled females (5.0%) than males (3.8%).

Impact of ICTs on Disabled People's Lives according to the Eight Core Domains

The impact that ICTs have on specific domains (Claes et al., 2010; Van Loon et al., 2010) is summarized in Table 2 below.

Domain	ICT positive impact	ICT negative impact
Emotional well-being domain: emotional safety and security which is categorised by positive experiences, containment and lack of stress	E-learning eliminates the need of face-to-face education, reducing the level of stress and discomfort faced by disabled learners (Bakhshi, Kamali, & Chabok, 2012). ICTs enable disabled people to communicate with people they would not normally be able to reach, reducing their loneliness (Söderström, 2009). Mobile ICTs allow response to crime, creating a safer feeling (Atkinson & Castro, 2008).	In order to be able to make use of ICTs, users must at the least have a basic level of knowledge on how to use them. Disabled people, just as everyone else, may find it challenging to make use of ICTs; this could result in an increase in stress levels (Söderström, 2009). Disabled people who chose not to adopt ICTs may become digitally excluded. This can create a further level of loneliness (Macdonald & Clayton, 2012).
Interpersonal relations: social life which is outlined by social networks, friendships and social engagement.	ICTs eliminate social barriers and increase participation (Bakhshi et al., 2012). This is achieved through the use of e-mail, adapted telephone systems, special messaging and social networks (Lancioni et al., 2011). The level of social exclusion is decreased. Disabled people may use ICTs to nourish long-distance relationships, especially for disabled people who are unable to visit their offline friends because of their inability to move around freely (Söderström, 2009).	ICTs may increase online relationships but may also remove face-to-face interactions which could jeopardize offline relationships (Söderström, 2009). Could result in the digital exclusion of some disabled people who choose not to adopt ICTs (Macdonald & Clayton, 2012). Some disabled people may become dependent on ICTs as a means of acquiring friendships and rely on it more heavily than they should (Söderström, 2009).
Material well-being: financial and employment status influencing housing, standard of living and possessions.	Permits global job and e-work opportunities which do not even require disabled people to leave their house (Bakhshi et al., 2012); (do Rosario Alves de Almeida, M, Porfirio and Pereira, 2011).	The high cost (affordability) of ICTs equipment and communication could potentially challenge the adoption and accessibility of ICTs (Macdonald and Clayton, 2012).

Personal development: refers to the level of education and personal skills.	Access to information on the internet empowers (Lancioni et al., 2011). Mobile education allows learners with disabilities to engage with content in a more relaxed manner (Zionch, 2011). Lower barriers to learning (Manresa-Yee, Muntaner & Sanz, 2012).	Dobransky and Hargittai (2006) suggested that ICTs had no influence on the education aspect of the disableds' lives unless the educational institutions made provision and encourage mobile as an educational platform.
Physical well-being: health status, including nutrition, recreation and physical exertion.	Decrease in hospital visits and stays because of access to medical information from the comfort of one's own home. (Dobransky and Hargittai, 2006)	There is little proof that ICTs had a general impact on the lives of the disabled which was very surprising and suggested a further form of exclusion (Macdonald and Clayton, 2012)
Self-determination: personal goals and control as affected by decisions and choices.	Internet resources and ICT device features encourage personal liberation and can assist with life decisions (Bakhshi et al., 2012).	Too many ICT choices increase difficulty in decision making for purchasing and usage (Seale, Draffan, & Wald, 2010). Access to too much information makes it harder to decide what is reliable, accurate and to date.
Social inclusion: refers to the level of integration and participation within a certain community	Eliminates social barriers and increases participation (Bakhshi et al., 2012). ICTs allow for long-distance relationships (Söderström, 2009). E-learning, e-work, e-commerce, etc. can make individuals become part of various communities, promoting participation and personal liberation.	Disabled people who don't adopt ICTs face further exclusion, digital exclusion (Macdonald & Clayton, 2012). The use of ICTs can increase online relationships but may also remove face to face interactions which could jeopardize offline relationships (Söderström, 2009).
Human rights such as respect, dignity, equality, etc. and legal rights such as access, due process, etc.	Government can encourage the adoption of ICTs as a way of decreasing inequalities and improving the standard of living (Macdonald & Clayton, 2012). Ease of access/creation of advocacy groups.	The lack of ICTs regulation could result in misconduct that goes unpunished, e.g. cyber bullying (Seale et al., 2010).

Table 2: Impact of ICTs on disabled people's lives according to the eight core domains.

Some common barriers to the adoption and usage of mobile phones by disabled people are as follows (Dobransky & Hargittai, 2006; Macdonald & Clayton, 2012):

- **Cost of mobile phones:** one of the major barriers to the adoption of mobile phones by disabled people is the high costs associated with purchasing the mobile technology. This is especially true with smartphones because their level of specifications make them expensive (Macdonald & Clayton, 2012). In addition, Dobransky and Hargittai (2006) suggested that most disabilities make it hard for disabled people to earn a living and produce income for themselves. The inability to produce an income results in the not being able to purchase ICTs or mobile phones which increases the level of economical and digital exclusion.
- **Lack of skills, knowledge or information:** the lack of awareness of the possible opportunities that could be derived from the adoption of mobile phones; or the lack of skills or knowledge with regards to how use the mobile phones poses a barrier to the usage of mobile phones. The inability to use the mobile phones makes it hard to reap the possible benefits.
- **Lack of interest:** this is usually associated with the lack of knowledge. Since some people are not aware of the benefits of mobile phone, they become uninterested.
- **Inherent disability attribute:** one of the major barriers to the adoption of mobile phones is the disability or impairment that makes it inherently hard to use the mobile phone:
 - Blind people may find it impossible to use a mobile phone as they will not be able to see the screen. In the same regard, partially blind people may also find it hard to read the text off the screen due to the small size of the mobile phone.
 - Deaf people may not be able to make use of the various voice features of the mobile phone.
 - The physically incapacitated may find it hard to hold the mobile phone in their hands.

3. Research Methodology

The purpose of the research was to investigate the impact that mobile phones have on the overall quality of life of disabled people in Cape Town. The research adopted a survey approach. The final research sample consisted of fifty seven (n=57)

disabled people in Cape Town. The population of disabled people was accessed with the assistance of the University of Cape Town's Disability Unit which provided the contact details of various disability and community centres as well as individual connections that the Disability Service had. The manager of the University of Cape Town's Disability Unit was actively involved throughout the whole process.

A structured survey questionnaire was used; it comprised of closed questions as well as one section of open-ended questions. The survey included questions relating to the respondents' demographics, mobile phone accessibility and the level of importance they attached to the various aspects that represent QoL indicators. The third section used a four-point likert scale and was partly based in Sen's capabilities theory and used questions which were used in or modified from a similar study done by Kivunike et al. (2009). The modification was done to suit the needs of this particular research. The survey questionnaire is attached. Additionally, six follow-up interviews were done to provide deeper insight into the disabled people's QoL definition, perceptions and the factors that affect the nature of mobile phone adoption and accessibility. In addition the interviews provided insight as to how mobile phones could be used to empower the lives of disabled people. The research followed the institutional ethics guidelines and ethics approval was obtained.

4. Data Analysis

Of the surveys that were issued, only 68 responses were received. Out of the 68 responses, 16 were rejected based on the fact that the people did not meet the prerequisites for participation in the study. The prerequisites were that the participants had to be disabled, own a smartphone or feature phone, and be located in Cape Town. The remaining 52 responses were checked for validity and all these were considered accurate and useful for analysis.

Reliability and Validity Analysis

Given that this instrument has, to our knowledge, not been used in South Africa before, it is important to assess its validity and reliability. Cronbach Alpha was used to assess the reliability of the constructs within the questionnaire. Cronbach Alpha measured the internal consistency of the set of questions under each construct. An acceptable Cronbach Alpha score is between 0.6 and 0.7 and a good Cronbach Alpha score is one that is above 0.7. Table 3 depicts the results from the Cronbach Alpha test. All constructs have a high Cronbach Alpha score and are therefore considered to be reliable.

Construct	Number of items	Cronbach alpha	Accepted?
OPPORTUNITIES			
Social opportunities	12	$\alpha = 0.818$	Yes
Economic facilities	5	$\alpha = 0.798$	Yes
Political freedom	4	$\alpha = 0.744$	Yes
ACHIEVEMENTS			
Social opportunities	12	$\alpha = 0.845$	Yes
Economic facilities	5	$\alpha = 0.869$	Yes
Political freedom	4	$\alpha = 0.785$	Yes

Table 3: Cronbach Alpha coefficients for Survey Instrument.

Factor analysis was the measurement applied to evaluate the validity of the questions. An exploratory approach was taken when conducting the factor analysis in order to test whether or not the 21 questionnaire items link to the set constructs. This approach was also used to explore the various possible dimensions which may exist within each construct. The analysis demonstrates that the twenty-one items loaded satisfactorily into the six categories. However, full validity analysis was hampered by the fact that the sample size is relatively small which makes factor analysis for a large number of test items difficult.

Demographic Characteristics of Survey Sample

Of the 52 respondents, 22 (42%) were male and the other 30 were female (58%). The largest group in the sample, accounting for 21 of the respondents, belonged to the "31-40" age group. Seventeen (32%) of the respondents fell into the "18-30" age group; this was the second largest age group. Eight (15%) of the respondents belonged to the age group "51-60"; 5 were in the "41-50" age group, and one respondent was older than 60. In terms of education, 42% (22) of the respondents obtained some form of tertiary education, while 18 (35%) had secondary and 10 (19%) only primary

education. This high proportion of respondents with tertiary education may not be representative of the disabled population at large; however, a bias was introduced because of the sampling frame. 2 respondents had vocational training or none/other. Most respondents were students (29%) or private employees (27%). “Other” represented 17.3% of the respondents, and 4 (8%) of the respondents were either unpaid family or domestic workers. Furthermore, another 8% of the respondents were employers and 6% were too old or not working. Finally, the “own account worker” and “government employee” categories were represented by one respondent each, or 1.9% (per category) of the respondents.

The Washington Group’s (WG) framework was adopted in order to identify people with disabilities. This framework uses six key sets to identify people with disabilities (Madans et al., 2011; Statistics South Africa, 2012). According to WG framework, an individual who experiences some difficulty in two or more of activities; or has a lot of difficulty/is unable to do the activity at all was classified as disabled. Figure 1 depicts the frequencies of the degrees and categories of disability in our sample.

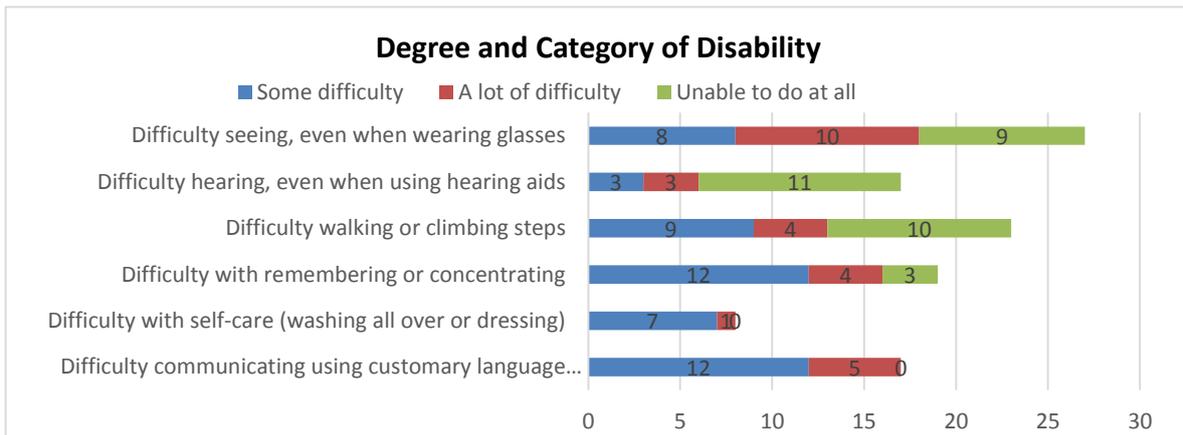


Figure 1: Degree and category of

Mobile Phone Usage

This section provides a brief overview of which features are used the most or the least. The features that respondents use

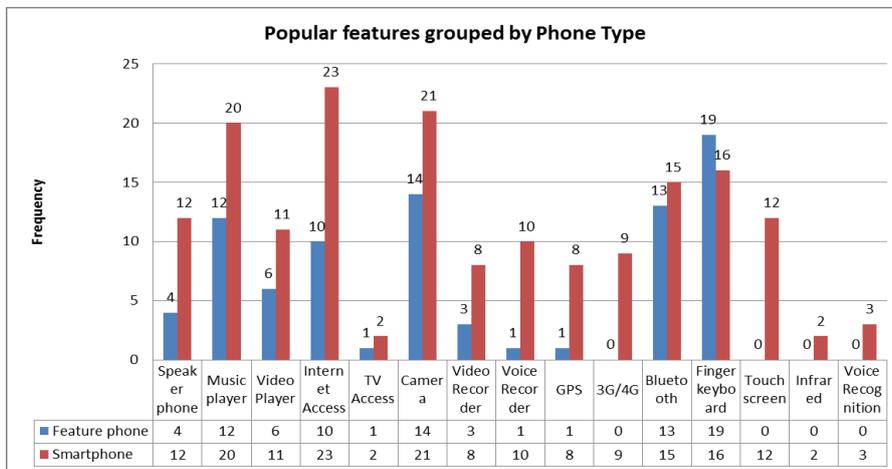


Figure 2: Features used grouped by the type of

more than once a week are reflected in a bar graph below and marked as popular features. The feature usage maybe linked to the type of phone being used. Figure 2 groups the various features according to the category of phone being used. From the figure, the most used feature per phone type was the internet, which was accessed by the respondents with smartphones. The second and third most popular features were also accessed by smartphone respondents and they were the camera and the music player. Feature phones’ most used features was the finger keyboard, followed by camera and Bluetooth.

Smartphones have better computing ability, improved connectivity and advanced features in comparison to feature phones. Correspondingly, smartphone respondents seem to use more features than feature phone respondents. For instance,

features such as 3G or/and 4G, touchscreen and voice recognition could only be used by respondents with smartphones.

Perceived Opportunities and Actual Use of Mobile Phones

Respondents were required to rate the level of importance they placed on the various opportunities available on mobile phones. A four point Likert scale was used, ranging from “Not important” to “Very important” (Figure 3).

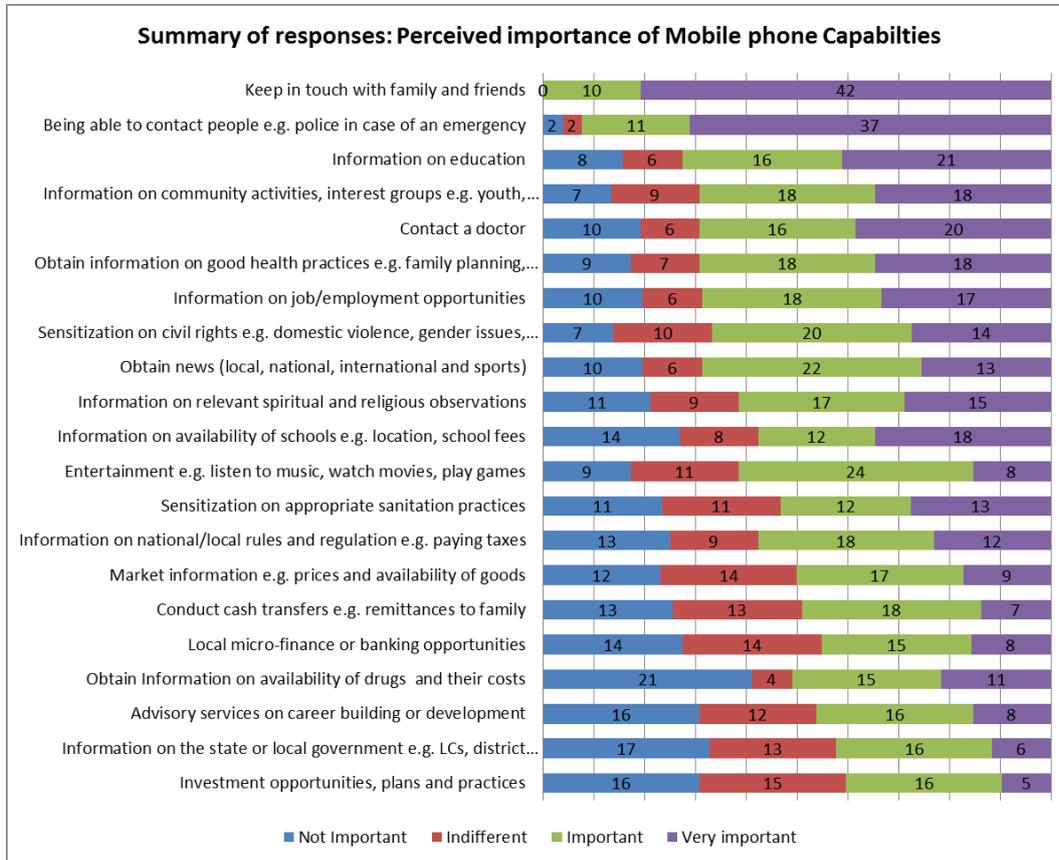


Figure 3: Summary of responses: Perceived importance

Respondents perceived keeping in touch with family and friends, being able to contact people, information on education, information on community activities, and contacting a doctor as the most important opportunities that mobile phones can avail. Investment opportunities, information on state or local government, advisory services, obtaining information on the availability of medical drugs and their costs were perceived as least important. None of the respondents perceived keeping in touch with family and friends as not important. The standard deviation ranged from 0.398 to 1.225.

Next, the respondents were required to rate their *actual use* or exploitation frequency of the opportunities provided by the mobile phone, using a four point Likert scale which ranged from “Never” to “Always”. Table 4 summarises the means and standard deviations of the achievements of mobile phone opportunities in terms of the frequency of use for the ten most used or achieved opportunities. Keeping in touch with family and friends, being able to contact people, entertainment, obtaining local news, and information on education were the most achieved. Obtaining information on the availability of drugs and their costs, information on the state or local government, investment opportunities, advisory services and local micro-finance were the least achieved. The standard deviation ranged from 0.610 to 1.331.

Actual Achievements	Mean	Std. Deviation
Keep in touch with family and friends	3.71	0.610
Being able to contact people e.g. police in case of an emergency	3.00	1.252

Entertainment e.g. listen to music, watch movies, play games	2.81	1.155
Obtain news (local, national, international and sports)	2.57	1.100
Information on education	2.45	1.331
Information on job/employment opportunities	2.31	1.191
Conduct cash transfers e.g. remittances to family	2.29	1.210
Information on availability of schools e.g. location, school fees	2.27	1.285
Contact a doctor	2.24	1.159
Information on community activities, interest groups e.g. youth, women, disability centres, etc.	2.23	1.148

Table 4: *Actual Achievements.*

Effects of Demographics on Perception of Mobile Phone Opportunities

There appeared to be some relationships between demographics and the perception of mobile phone opportunities. This was tested using an ANOVA test and the results of statistically significant relationships are depicted in Table 4. Gender did not significantly affect the perception of opportunities that can be derived from mobile phones. However, age significantly affected information on community activities, information on relevant spiritual and religious observations, information on schools, advisory services on career building, and development and sensitization on civil rights. Education significantly affected obtaining information on good health, obtaining information on availability of drugs, entertainment, information on community activities, information on national or local government, and sensitization on civil rights. Employment, main activities in last six months had a significant effect on the same opportunities as those by Education with only one exception, which was entertainment as Employment apparently had no significant effect on entertainment whereas Education has.

Mobile Device Opportunities	Age		Education		Employment	
	F	p-value	F	p-value	F	p-value
Obtain information on good health practices e.g. family planning, AIDS, etc.	1.476	0.225	4.541	0.003	3.312	0.007
Obtain information on availability of drugs and costs	2.341	0.069	5.936	0.001	2.746	0.019
Entertainment e.g. listen to music, watch movies, games	1.886	0.129	2.830	0.035	0.672	0.694
Information on community activities, interest groups e.g. youth, women, disability centres, etc.	2.983	0.028	3.372	0.017	3.333	0.006
Information on spiritual and religious observations	2.639	0.045	2.399	0.063	1.672	0.142
Information on schools e.g. location, school fees	2.600	0.048	1.425	0.240	1.000	0.444
Advisory services on career building or development	4.261	0.005	0.977	0.429	0.524	0.812
Information on the state or local government	2.037	0.104	3.582	0.012	3.145	0.009
Sensitization on civil rights e.g. domestic violence, gender issues, disability issues	2.767	0.038	3.828	0.009	3.070	0.011

Table 5: *Effects of demographics on perceived opportunities.*

Similarly to the demographics, the nature (or category) of disability as a causal variable on perceived opportunities was also tested but proved to be largely insignificant, probably due to the small sample size. For instance, disability in the categories seeing, self-care, and communicating had no significant influence on the perceived importance of mobile phone opportunities towards QoL. However, the hearing disability category had an influence on the keeping in touch with family and friends, information on community activities and investment opportunities. The walking category, rather inexplicably, only had a significant influence on investment opportunities.

5. Findings and Implications

Perception of the Role of Mobile Phones towards Quality of Life

Opportunities provided by mobile phones under the social dimension were perceived as much more important than opportunities in the economic and political dimensions. Aspects such as keeping in touch with friends and family, education (information on the skills institutions offer) and obtaining new friends were among the top opportunities perceived as important by respondents. These results are consistent with the study by Kivunike et al. (2009) which suggested that, despite the limited economical resources in developing countries such as South Africa, individuals still value social opportunities such as interacting with friends and family. Survey respondents also identified contacting a doctor, having access to information on community activities and obtaining information on good health as important opportunities. The social opportunity that was considered to be least important was information on drugs and their costs.

Information on job opportunities was considered to be the aspect that was considered to be the most important economic opportunity. Given the statistics on the employment status of the respondents, an assumption can be made which suggests that most of the respondents were seeking for a job. For example, the majority of the students were tertiary students, so at some point during or after varsity they will be seeking for a job.

Finally, the survey respondents suggested that being able to contact someone in case of an emergency was very important.

Effects of Demographics on Perceived Importance

The influence of personal characteristics on the perceived importance of mobile phones was also researched. Education had a significant influence on various opportunities, mostly in the social dimension, followed by one in the economic and political dimension. This can be accounted for by the fact that a substantial number of respondents (42%) had tertiary qualifications and another 35% had secondary education. In addition, age had a significant influence on a few aspects, mostly being related to social opportunities then followed by economic and political. The majority of the respondents were in the 31-40 and 18-30 age groups. This could explain why aspects such as having access to information on schools and advisory services on career building or development were significantly influenced by age. The 31-40 age group could be interested in information on school and advisory services because they could be wanting to enrol their kids in schools, whereas the 18-30 age group could be wanting to enrol into tertiary institutions. Employment also had a significant influence on a few aspects, mostly in the social dimension followed by the political dimension. Employment has no significant effect on the aspects in the economic dimension; this can be accounted for the fact that majority of the respondents, 29% were students, whereas 27% were private employees. In this respect, the lack of significant influence of main activities on economic dimension could be that respondents are content with their employment status and do not wish to improve it in any manner.

Aside from the basic demographic characteristics, disability characteristics also had an effect on how respondents perceived the importance of mobile phone opportunities. Only three out of the six categories of disability influenced the perceived importance of opportunities. Hearing had a significant influence on social opportunities such as keeping in touch with family. The walking category only significantly influenced one aspect under the economic dimension. In contrast, the remembering category had a significant influence on a number of aspects such as sensitization on appropriate sanitation practices, information on education, information on schools. It also had an influence on the economic dimension, local and macro opportunities, and sensitization on civil rights (which fell under the economic dimension).

Actual Achievements (Impact of Mobile Phone Capabilities on QoL)

The results obtained under the actual achievements section suggest that a considerable amount of social opportunities were exploited by respondents, followed by economic and political opportunities respectively. These results are consistent with the study by Kivunike et al. (2009) which suggested that, despite the limited economical resources in developing countries such as South Africa, individuals still value the social opportunities such as interacting with friends and family. Even though respondents seem to be exploiting social opportunities, it is possible to agree with a study by Söderström (2009) which established that, even through disabled people increase their online social interaction, it may also remove face-to-face interactions which could jeopardize offline relationships. Information on education was also amongst the top opportunities that were being exploited. In a previous study, Dobransky and Hargittai (2006) found that ICTs had no influence on the education aspect of the disabled people. The results from this research disagree with the findings made by Dobransky and Hargittai (2006) as respondents were able to access educational information from their mobile phones.

The least exploited opportunity under the social dimension was using the mobile phone to obtain information on the availability of drugs and their costs. This result disagrees with a previous study by Dobransky and Hargittai (2006), which

found that using the mobile phone could lead to a decrease in hospital visits and stays. The decrease was due to the availability of ICTs which allowed disabled people to access medical information from the comfort of their own homes.

Using the mobile phone to access information on job/employment opportunities was the most exploited opportunity under the economic dimension. This is supported by a previous study by do Rosario Alves de Almeida, Porfirio and Pereira (2011) which found that the use of ICTs amongst disabled people could increase employment opportunities in the form of e-work which allows individuals to complete their job specifications without having to physically go to the place of work. E-work permits disabled people to be active participants in the economy. The other opportunities under the economic dimension were hardly exploited at all.

Under the political dimension, one opportunity was exploited frequently; this was being able to contact people, e.g. in case of an emergency. The findings from Kivunike et al (2009) also depicted a small number of responses of QoL in relation to political freedoms. That study suggested that possible reasons for this was the fact that political freedoms were mostly dependent on government action and, unless the government puts the necessary mechanisms in place, the opportunities cannot be utilized.

Gap between Perceived Opportunities and Actual Achievements

Comparing the perception of opportunities to actual achievements allows for a gap analysis to be conducted by looking at the difference between ratings of importance and use. Even though the Likert scales for the two question sets do not use the same scale, this should not impact on the relative degree of difference. We found that most forms of social opportunities were perceived as very important and were the most frequently exploited. This can be seen with regards to keeping in touch with family and obtaining information on education. Conversely, those that were perceived to be least important were exploited the least. This is supported by the information systems technology acceptance theory that suggest that perception of how useful a technology is affects its eventual use (Toboso, 2011).

However, there were opportunities that had large gaps, which suggests that the level of importance and the exploitation frequency do not correspond. This is explained by Toboso (2011) who found that there are various factors that could challenge the adoption and the usage of mobile phones by disabled people.

Factors That Challenge the Adoption of Mobile Phones

From the open-ended questions as well as from a number of subsequent interviews, we probed which factors inhibited the adoption of mobile phones. Our findings corroborate previous studies by Dobransky and Hargittai (2006) as well as by Macdonald and Clayton (2012). These previous studies identified cost of mobile phones, lack of knowledge and skills, and inherit disability attributes as barriers or challenges to the adoption of mobile phones by disabled people. The findings from Milosevic et al. (2013) as well as Wong (2010) also identified a number of issues with mobile phones such as security and privacy, limited energy capacity, and screen size. Although these findings were not specific to disabled people, this research also identified them, which suggests that non-disabled people face some similarities with regards to factors that challenge the adoption of mobile phones by disabled people.

6. Conclusion

This research set out to investigate how mobile phones affect the Quality of Life of disabled people. We probed both the perception on the opportunities afforded by mobile phones as well as their actual use. Most respondents made use of various opportunities identified under social opportunities in the QoL indicators, and only a few under the economic and political freedom dimensions. Furthermore, the respondents only identified basic opportunities under the economic facilities dimension such as owning a comfortable home and making money. This indicates that respondents prefer to live a life that is driven by social opportunities but at the same time, need to have access to basic economic opportunities such as a job and shelter.

Equally, most respondents perceived more aspects as important under the social opportunities dimension when compared with the economic and political dimensions. A possible reason for this could be that, when they were asked to define QoL and list factors they attach to QoL, most of them defined QoL using social opportunities. Furthermore, their demographic characteristics may have also played a role in their perceived importance of mobile phone opportunities towards QoL. Age, education and employment had an effect on the perceived importance of most social opportunities. These three

demographics only had an effect on a few economic (advisory services on career building or development) and a few political dimensions such as sensitization on civil rights and information on the state or local government.

The mobile phone opportunities that were being exploited the most are those under the social opportunities dimension. Again, this can be linked from the definition, to the perceived importance. Furthermore, factors that challenge the adoption of mobile phone could also explain why not certain opportunities are being exploited or not.

The QoL framework suggested by Van Loon *et al* (2008) can be adopted in order to examine what impact mobile phones have on the quality of life of disabled people or any other groups of people. The framework allows one to study this impact by investigating what people can do given the opportunities which in this research are made available through the mobile phone.

A major limitation of this study is the relatively small sample size and its geographic locus, i.e. the Cape Town metropolitan area. It is acknowledged that the situation in Cape Town is not necessarily representative of other African cities. Therefore, further research is advised to validate our findings, especially in other regional contexts. It must also be noted that the instrument used here relies on self-reporting; this may introduce bias when compared with more objective instruments. Refer to the active and lively debate around whether quality of life should be based on own perceptions and self-reported, or whether objective measures should be used (Van Loon *et al.*, 2010). Another limitation of our research is that we focussed on the positive impacts in our empirical research. However, as shown in the literature and summarized in Table 1, mobile ICTs also have the potential to impact QoL negatively. Future research should endeavour to investigate potential negative impacts and see to what extent these are cancelled out, if at all, by the positive opportunities.

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8. Research questionnaire

1. Please select your gender: Female/Male
2. Please select your age group: 18-30/31-40/41-50/51-60/Older than 60
3. Highest level of education: Primary/Secondary/Tertiary/Vocational/None/other
4. Main activities in last 6 months:/Employer/Own Account Worker/Government Employee/ Private Employee/Unpaid family or domestic workers/Student/Too old or not working /Other
5. Please select the applicable category of disability(s) as well as the degree of the disability: (Scale: No difficulty/Some difficulty/A lot of difficulty/Unable to do at all)
 - Do you have difficulty seeing, even if wearing glasses?
 - Do you have difficulty hearing even if using hearing aid?
 - Do you have difficulty walking or climbing steps?
 - Do you have difficulty remembering or concentrating?
 - Do you have difficulty (with self-care) washing all over or dressing?
 - Using your usual (customary) language, do you have difficulty communicating, (for example understanding or being understood by others)?
6. What type of mobile phone do you own? Feature phone (Internet capabilities but unable to load apps)/Smart phone (Capable of loading apps)
7. Please specify the make and model of the type of phone selected above (question 5):
8. How long have you had your current mobile phone for? Less than 6 months/6 months - 1 year/1 - 2 years/2- 4 years/More than 4 years
9. The features you use more than once a week (check all that apply): Speaker phone Music player/Video player/Internet access/ TV access/Camera/Video recorder/Voice recorder/ GPS/ 3G/ 4G/ Bluetooth/Finger keyboard/ Touchscreen/ Infrared/ Voice recognition/Other:
10. How many mobile applications do you have on your phone?
11. Please list a few mobile applications you have on your phone (if you have any):
12. Please rate the level of importance you attach to the listed factors that can be or are actually achieved by means of using the cell phone. (Scale: Not important / Indifferent / Important / Very important). My cell phone allows me to:
 - Obtain information on good health practices e.g. family planning, AIDS, etc.
 - Obtain Information on availability of drugs and their costs
 - Contact a doctor
 - Sensitization on appropriate sanitation practices
 - Keep in touch with family and friends
 - Obtain news (local, national, international and sports)
 - Entertainment e.g. listen to music, watch movies, play games
 - Conduct cash transfers .g. remittances to family
 - Information on community activities, interest groups e.g. youth, women, disability centres, etc.
 - Information on relevant spiritual and religious observations
 - Information on education
 - Information on availability of schools e.g. location, school fees
 - Market information e.g. prices and availability of goods
 - Investment opportunities, plans and practices
 - Local micro-finance or banking opportunities
 - Information on job/employment opportunities
 - Advisory services on career building or development
 - Information on the state or local government e.g. LCs, district administration
 - Sensitization on civil rights e.g. domestic violence, gender issues, disability issues
 - Information on national/local rules and regulation e.g. paying taxes
 - Being able to contact people e.g. police in case of an emergency
13. Please rate how frequently you exploit the various opportunities that can be achieved through the usage of your cell phone. (Scale: Never / Seldom / Occasionally / Always). With my cell phone, I perform the following tasks: [Using similar list as for question 12].

14. Please list the various factors that you think challenge the adoption of mobile phones.
15. What is the most positive effect or contribution which your mobile phone had/has on your life?
16. What is the most negative effect your mobile phone has on your life?
17. What feature(s) of the phone could be improved upon to make them more suitable to your needs?

Towards a Holistic Approach for Managing Patient Safety Risks Associated with Electronic Patient Records

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Abstract

Our society is increasingly being influenced by information and communication technology (ICT). Healthcare, an important part of society has benefited immensely from this development. The increasing use of ICT is one of the major developments in today's healthcare. One such development is the use of electronic patient records (EPRs), an electronic method of storing and managing patients' medical records. Electronic patient records offer a number of benefits including improving patient safety which is regarded as a fundamental principle of healthcare. However, EPRs can introduce safety risks which are often unintended and unexpected that could harm the very patients that are supposed to be protected. The problem is that the magnitude and nature of these risks are largely unknown making it difficult to effectively manage the risks. With more healthcare organisations adopting EPRs there is a growing concern about EPR risks and patient safety. This paper asserts that in order to ensure that EPR risks are managed effectively, efficiently and consistently, it is important to adopt a holistic approach to managing risks. Thus, this paper motivates the need for a holistic approach by evaluating existing approaches for managing the safety risks associated with EPRs to improve patient safety.

Keywords

Electronic patient records, patient safety risks, holistic management of risk

1. Introduction

Various systems are presently being implemented to take advantage of information and communication technology (ICT) for efficient and effective storage and utilisation of medical and healthcare information, which are normally stored in a dispersed manner (Ishigure, 2011). One such system is the implementation of electronic patient records (EPRs), an electronic method of storing and managing patient information (de Veer & Francke, 2010).

Electronic patient records have been welcomed to address some of the risks associated with the paper-based method of storing patient information, including improving patient safety.

Although EPRs have the potential to improve patient safety, it has emerged that EPRs can also introduce safety risks which could compromise the safety of patients and therefore need to be managed. The problem is that the extent and nature of these risks are mostly unknown making it difficult to effectively manage the risks. With more healthcare organisations adopting EPRs there is growing concern about EPR risks and the safety of patients.

This paper asserts that in order to ensure effective, efficient and consistent management of EPR risks, consistent processes within a comprehensive framework needs to be adopted. This entails adopting a holistic approach to managing risks. Thus, this paper motivates the need for a holistic approach to managing the patient safety risks associated with EPRs to improve patient safety. This was done by conducting a literature review to identify a holistic approach to managing risk (in general) as well as existing approaches to manage the safety risks associated with EPRs (in particular). The existing approaches were evaluated against the steps comprising a holistic approach to managing risk, through logical argumentation.

The remainder of this paper briefly describes electronic patient records in section 2, followed by patient harm associated with EPRs in section 3. Section 4 discusses a holistic approach for managing risks, followed by an evaluation of existing approaches for managing patient safety risks associated with EPRs in section 5. Section 6 concludes this paper.

2. Electronic Patient Records

According to Leiner et al. (2003), a patient record consists of all the information generated or received during the care of a patient at a healthcare institution. An EPR is a patient record that is stored and accessed through a computer interface and can be used as a generic concept to include all kinds of electronic records including electronic medical records (EMRs), personal health records (PHRs) and electronic health records (EHRs) (Leiner et al. 2003). These electronic records are briefly described below.

An EMR is an electronic version of a paper medical record containing all of a patient's medical history from one service provider. Included in an EMR are the patient's medical history, symptoms, diagnoses as well as laboratory, pathology and radiology results if the functionality is available (Garets & Davis, 2005; Garets & Davis, 2006). An EMR is created, managed, owned and consulted by healthcare professionals from a single institution (Garets & Davis, 2006).

A PHR is an electronic record, usually web-based, that allows an individual to manage his/her health related information gathered from different sources, including both the individual and healthcare service providers as sources. The PHR is created, managed and owned by the individual (Tang et al. 2006).

An EHR is an electronic record of a patient's health information containing a summary of the patient's clinical data from multiple service providers (Garets & Davis, 2006; International Organisation for Standardization, 2005). The main purpose of an EHR is to make health information available to all providers involved in the care of a patient at any time and in any healthcare setting (Sheikh et al. 2011). An EHR relies on the existence of an electronic medical record which is their source of data (Garets & Davis, 2006).

For the remainder of the paper EPRs will be used as a collective to refer to EMRs, PHRs and EHRs. Although the context of the research is management of risk by healthcare service providers (i.e. institutional), the PHR is included in the collective name of EPR, recognizing that PHRs can be tethered to EMRs or populated from institutionally-owned medical records.

Electronic patient records are utilised by various healthcare professionals including physicians, nurses, radiologists, pharmacists, laboratory technicians and radiographers in different healthcare settings such as hospitals, ambulatory care, nursing homes, community care, home health agencies, dental care, and pharmacies (Johnson et al. 2011).

Electronic patient records offer a number of benefits over the paper based record including sharing of patient information amongst healthcare practitioners; workflow efficiency; reduction of medical errors; patient privacy and confidentiality; and reduction of cost of care (Hillestad et al. 2005; Institute of Medicine, 2012).

Electronic patient records thus have the potential to improve the efficiency, quality and safety of patient care. Despite these benefits, EPRs have been associated with patient safety risks which can result in harm to patients thereby compromising the safety of patients (Ash et al. 2004; Institute of Medicine, 2012; Magrabi et al. 2010; Myers et al. 2011; Pennsylvania Patient safety authority, 2012).

3. Patient harm associated with EPRs

Patient harm as used in this research study refers to adverse events or harmful incidents resulting in injury, disease, suffering, disability and death to a patient (Runciman et al. 2009). Evidence of patient harm resulting from EPR related incidents is mounting (Magrabi et al. 2010; Myers et al. 2011; Pennsylvania Patient safety authority, 2012). With more healthcare organisations adopting EPRs, there is a growing concern about patient safety risks associated with EPRs (Middleton et al. 2013; Sparnon & Marella, 2012; Department of health & human services, 2013). Patient safety risks refer to risks that can lead to patient harm. As the healthcare sector delves into cyberspace in terms of use of EPRs, it is exposed to a variety of risks that can lead to patient harm. Healthcare has been found to be among the most vulnerable in terms of cyber risk. This leaves room for exploitation by hackers who can steal patient information to utilise in identity theft or to shut down critical hospital systems. For example, a network server at Utah Health Department in the United States of America was hacked and about 780,000 people's medical data were accessed and an unidentified number of records stolen (O'Harrow Jr, 2012). There are also risks relating to information input such as, incorrect data entry causing inaccurate patient information. For example, incorrect amounts of sodium was mixed for a baby in an intravenous bag resulting in death of the baby (Perez, 2011); a loss in the medication record (data loss/unavailability) of a patient resulted in her death

(Robertson, 2013); unauthorised access of patient health information which could easily be promulgated over the internet to an unlimited number of people aggravating the risk of harm (breach of privacy and confidentiality) (Hoffman & Podgurski, 2007). It is therefore important that EPR risks are managed.

The next section investigates an accepted approach for managing risks with a view to understanding what constitutes a holistic approach for managing risks in general.

4. A holistic approach for managing risk

As early as 2005, the authors Gerber and Von Solms (2005) argued the need for a holistic approach for managing risks, in particular as relating to the information security context. The authors argued that risks are not fragmented into compartments or silos and suggested the adoption of a holistic view for assessing and managing risks. These arguments are embodied in the ISO/IEC 31000 and 31010 standards for risk management advocating a holistic approach to risk management in general and incorporating the following steps (ISO/IEC 31000, 2009; ISO/IEC 31010, 2009):

1. Establish risk context
2. Risk assessment
 - 2.1 Risk Identification
 - 2.2 Risk Analysis
 - 2.3 Risk Evaluation
3. Risk treatment
4. Monitoring and review
5. Communication and consultation

The various steps are briefly explained in order to explicate the basis that was used for the evaluation of risk management in the context of safety risks associated with EPRs (refer to section 5).

- *Step 1: Establishing risk context* – This step involves understanding the context in which a risk exists by defining the parameters to take into account when managing risk.
- *Step 2: Risk assessment* - This step involves identifying the risk, analysing the risk and evaluating the risk (ISO/IEC 31000, 2009; ISO/IEC 31010, 2009).
 - *Step 2.1: Risk identification* entails identifying the sources of risk (what can go wrong and how) aimed at generating a comprehensive list of risks.
 - *Step 2.2: Risk analysis* seeks to develop an understanding of risk and provides an input to risk evaluation.
 - *Step 2.3:* Based on the result of risk analysis, risk evaluation serves to assist in decision making regarding the treatment of risks by comparing the level of risk with the established risk criteria.
- *Step 3: Risk Treatment* – Risk treatment involves selecting one or more options for treating the risks such as avoiding the risk, transferring the risk, accepting the risk, or mitigating the risk.
- *Step 4: Monitoring and review* - Due to the dynamic nature of risk arising from the continual changing environment, risks and controls need to be monitored and reviewed regularly through regular audits or inspections to ensure that the controls are in place and functioning as expected.
- *Step 5: Communication and Consultation* - Effective communication and consultation are necessary throughout the entire risk management process. This is to ensure that the stakeholders understand why certain decisions are made and the reasoning behind specific actions that are taken regarding risks and their management.

The afore-mentioned steps of a holistic approach for managing risk are evaluated against existing approaches for managing patient safety risks associated with EPRs in the next section. This offers insight as to whether these approaches can be considered to be holistic in the sense of addressing all the steps of managing risk as identified in section 4.

5. Evaluation

Some researchers have proposed ways to manage the safety risks associated with EPRs. The primary nature of these proposals is to provide guidelines or recommendations. For example, Walker et al. (2008) propose the development, communication and annual review of EPR safety best practices in order to ensure the safety of EPR. Jones et al. (2011) recommend adhering to best practices in order to avoid unintended consequences arising from the selection,

implementation, and use of EPR. Bowman (2013) provides recommendations for reducing EPR risks through reduction of EPR system design flaws, improving system usability and proper use, and reporting EPR-related adverse events and system concerns. Singh et al. (2013) propose the development of EPR safety assessment guides with actionable checklist-type items to help address EPR-related risks. Sittig and Singh (2013) propose a “red-flag”-based approach for detecting EPR safety risks in an attempt to manage EPR risks. Ash et al. (2014) provide a checklist of “recommended practices” for healthcare organisations to self-assess the safety and safe use of EPRs.

This section maps four of the six afore-mentioned existing approaches for managing patient safety risks associated with EPRs to a holistic approach for managing risk in an attempt to motivate the gap in the existing approaches. The approaches of Sittig & Singh (2013) and Ash et al. (2014) are excluded from the mapping due to lack of availability of information. The mapping is done by indicating with a tick (✓) whether the existing approaches (in publication order) present a holistic approach for managing risks by incorporating all the steps for the holistic management of risks as presented in section 4. A cross (X) indicates that a step is not explicitly included. The author assessed each step using the ISO/IEC 31000 and ISO/IEC 31010 standards’ definition and only indicated a tick (✓) if the requirements of the step as stated in section 4 were mostly covered. The mapping presented in Table 1 is subject to the availability of information in the source papers.

Existing Approaches		Walker et al. (2008)	Jones et al. (2011)	Bowman, (2013)	Sittig & Singh, (2013)
Establish Risk Context		x	x	x	x
Risk Assessment	Risk Identification	x	✓	✓	✓
	Risk Analysis	x	x	x	x
	Risk Evaluation	x	x	x	x
Risk Treatment		✓	✓	✓	✓
Monitor & Review		x	✓	x	x
Communication & Consultation		✓	x	x	x

Table 1: Mapping of existing approaches with components of a holistic approach for managing risk

From Table 1, the existing approaches for managing patient safety risks associated with EPRs do not explicitly include step 1 (establishing risk context) in the way it is defined in the ISO/IEC 31000 and ISO/IEC 31010. Walker et al. (2008) did not explicitly discuss risk assessment, review and monitoring of risks and controls. They however discussed ways to prevent and reduce risks (risk treatment) as well as communication of risks to stakeholders (communication & consultation). Jones et al. (2011) discussed identification of unintended consequences of EPRs (risk identification), practices to avoid and remediate unintended consequences of EPRs (risk treatment) and monitoring remediation plans using issues log (risk monitoring). The authors did not explicitly discuss other aspects of risk assessment (risk analysis and evaluation) and communication & consultation. Bowman (2013) proposed ways to identify EPR risks before they affect patient care (risk identification) and reduce EPR risks (risk treatment). He did not explicitly discuss risk analysis, risk evaluation, monitoring & review, and communication & consultation. Sittig and Singh (2013) discussed ways of detecting EPR related risks (risk identification) and reducing the risks (risk treatment) but they did not explicitly discuss risk analysis, risk evaluation, monitoring and review, and communication and consultation.

From Table 1, it can thus be concluded that existing approaches for managing safety risks associated with EPRs do not present a holistic approach for managing risks. This is because none of the approaches explicitly includes all the steps required for the effective, efficient and consistent management of risks.

It is important that the management of risk includes all the required steps as any omission of any step could result in harm to a patient. Take for instance, the unavailability of a patient health record due to a system (server) failure. If the risk is not identified then the impact, likelihood and priority of the risk will be unknown as well as the response (treatment) that is needed. For example, a patient’s time under anaesthesia is prolonged because of a computer crash as a surgeon was

unable to access the patient's radiology record (O'Reilly, 2013). This could result to serious patient harm (Elkins, 2013). If the risk was identified and proper treatment (E.g. hot-swap server) implemented, this incident would not have taken place.

From section 5 it is evident that existing approaches discussed do not present a holistic approach to managing patient safety risks as described in section 4. This paper, having identified the gap in existing approaches (the lack of a holistic approach for managing EPR risks) motivates for a holistic approach to effectively and efficiently manage patient safety risks associated with EPRs.

6. Conclusion and future work

EPRs have the capacity to revolutionise healthcare with the many benefits that they provide including patient safety. However, EPRs can present safety risks that could harm the patients. The magnitude and nature of these risks are largely unknown making it difficult to effectively manage the risks.

In this paper, the authors utilised a literature review and argumentation to describe electronic patient records (electronic medical records, personal health records and electronic health records); patient harm associated with electronic patient records as well as a holistic approach for managing risk by which existing approaches for managing risks associated with electronic patient records were evaluated.

From the evaluation, it was concluded that existing approaches for managing patient safety risks do not present a holistic approach necessary for a consistent, effective and efficient management of risks.

It is the assertion of this paper that adopting a holistic approach for managing risks can assist in ensuring that risks associated with EPRs are consistently, effectively and efficiently managed. Future research will focus on developing a holistic approach for managing patient safety risks associated with EPRs. This process will utilise the design science approach (Hevner & Chatterjee, 2004; Hevner, 2007) incorporating the 3 design science cycles; relevance cycle (satisfied by this paper), design cycle and rigour cycle in order to achieve academic rigour.

7. References

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The role of e-tutors in promoting e-learning using Web 2.0 technologies

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Abstract

The University of South Africa (UNISA) is South Africa's largest Open Distance Learning (ODL) institution and the leading provider of higher education opportunities within the ODL sphere. UNISA's high student enrolment figures and its strict adherence to its ODL policy requires heightened efforts in student support. One mode of providing student support and increasing the throughput rate, is through the new e-tutoring model that was implemented in 2013. This e-tutoring model is provided via the Learner Management System (LMS), *myUNISA*.

UNISA currently has the capability to provide fully online programmes through its LMS, *myUnisa*. The role of Web 2.0 technologies in particular fosters a new construct to enhance the learning experience of students. This paper explores the concept of interactive learning by focussing on the use of Web 2.0 technologies by e-tutors in undergraduate modules to enhance the teaching and learning process.

Keywords

E-tutoring, Distance education, e-learning, Web 2.0 technologies, Learning Management System (LMS), Open Distance Learning (ODL)

1 Introduction

The development of new technologies in higher education has changed drastically in recent years. The past years have seen a revolution in the manner whereby education is delivered with today's student being "more informed and technology savvy" than in the past (Wiid et al., 2013).

Due to the increased reliance of technology both as a teaching and learning delivery mechanism in distance education, it is imperative that distance education institutions make use of technology-enhanced learning and innovative assessment for academic student support. Amongst these technological developments, many higher education institutions (and educators) are now expected to familiarize themselves with the world of social media applications and social media users (Selwyn, 2012).

The University of South Africa (UNISA) is the largest Open Distance Learning (ODL) organisation in South Africa dedicated to providing quality education with the prospect of connecting the student and the lecturer (Wessels, 2012).

UNISA's definition of ODL is "a multi-dimensional concept aimed at bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware and student and peers" (UNISA, 2008). The definition implies that, in the context of a formal learning system, ODL is focused on removing barriers to access learning, a flexible means of providing learning, student-centricity, student support, and constructing learning programs with the prospect of helping students.

One challenge UNISA is currently facing is the growing use of information technology in the modern world. Information and Communication Technology (ICT) is vital within the ODL environment to ensure that the "distance gap" is bridged between lecturers, students and the institution. Distance education is extending to all areas of education and the proliferation of worldwide communications networks has redefined the concept of distance learning and the delivery thereof. The traditional mode of delivery by means of printed materials and face-to-face discussion classes has been replaced by the concept of electronic learning (e-learning). E-learning is a mode of learning in which the educational process is supported by ICT (Sulčić and Sulčić, 2007).

At UNISA, e-learning takes place via the Learning Management System (LMS), *myUNISA*. As of 2013, e-tutors were appointed to drive the e-learning process. As an ODL institution, UNISA emphasises the important role of the tutor in the teaching and learning environment in order to support students to achieve greater access, and improve their pass and throughput rates (Ngengebule et al., 2007).

In any attempt to improve teaching and support practices (and learning outcomes), engaging tutors, who have direct contact with learners is most productive (Calvert, 2006). Calvert (2006), further adds that direct student tutors play a pivotal role in guiding both the social and intellectual or academic aspects of education and training and therefore provide valuable insight in refining and improving instructional design and delivery approaches in ODL.

The tutor is central to both student support and assessment and role of the tutor at undergraduate level is twofold (UNISA, 2008). The first role is to facilitate and guide the learning of students to obtain the necessary skills and competencies to cope with their studies. The second role is to prepare students to become self-directed learners, attending to any difficulties they might encounter, conducting tutorials and, marking and providing feedback on assignments. Both these roles can be done via face-to-face, telephone and online tutoring. The focus of this research is on online tutoring, also known as e-tutoring.

The objective of this paper is to engage with research in teaching computing subjects in an ODL environment. More specifically, it relates to exploring academics' use of technology-enhanced learning by e-tutors towards academic student support in the School of Computing (SoC) at UNISA.

This paper includes a discussion on how e-tutors envisage technology enhanced learning towards academic student support in an ODL computing environment. This entails obtaining feedback from e-tutors regarding their active involvement with technology-enhanced learning and in particular Web 2.0 technologies and the impact of this on academic student support.

This paper commences with an overview of e-tutoring followed by a discussion on the *myUNISA* LMS. Thereafter e-tutoring via the *myUNISA* platform is explored followed by an overview of the reflections of e-tutors. The paper concludes with a synopsis of the research.

2 E-Tutoring

Berge (1995) outlined four main e-tutor roles, namely pedagogical roles, social roles, managerial roles and technical roles. Pedagogical roles encompass tasks such as: guiding and maintaining students' involvement in discussions. Social roles involve the creation of friendly and contented social environments for students.

Managerial involve arranging learning activities and tasks, clarifying procedural rules and decision-making norms. Technical roles entail becoming conversant with the ICT systems and software that compose the e-learning environment. The technical role is the most important role because online technologies are used as the platform for teaching, support, management and assessment of students. Therefore all the other roles of an e-tutor are contingent on the technical role.

Technology plays a vital role in every aspect of higher education and especially in an ODL institution, namely for teaching and learning, research and community engagement (Prinsloo et al., 2011). Technology entirely replaces paper-based and face-to-face education manifesting in e-learning. At UNISA, the technical environment is *myUNISA*, a LMS that provides open distance learning (ODL) to about 300 000 students worldwide.

The following section provides an overview of the LMS environment, *myUNISA* and the prospects it has for e-tutoring and Web 2.0 technologies for teaching and learning.

3 The *myUNISA* platform

Most universities that offer ODL courses have their own education portals for learning and administrative support. These portals, commonly referred to as a LMS, have interactive communication capabilities which can be used to engage learners, lecturers and administrative staff (Ng, 2011). Most universities have adopted technology enhanced learning environments to facilitate academic student support. While other institutions across the country implement systems such as ClickUP (University of Pretoria) and eFundi (North-West University), the LMS used at UNISA is known as *myUNISA*.

UNISA uses *myUNISA*, as its LMS. This web space of academic and administrative information may be accessed by lecturers and students from any location, at any time and as long as is required. LMS's contain support features to assist learners' access to course material, submission of assignments and quizzes and discussion forums. The challenge is that the extent to which a module is presented and accessed on *myUNISA* depends on lecturer involvement and student participation.

Du et al (2013) identified three challenges of teaching in an ODL environment. The first challenge is the differences of education level, education system and knowledge structure among nations that lead to students differing in aspects of knowledge. The second challenge is the interaction between lecturers and students in ODL teaching/learning activities. Most methods used in ODL teaching/learning, such as e-mail, online materials and discussion forums (like *myUnisa*), DVD, satellite broadcast, and printed materials are half-duplex communication, i.e. up and down communicating channels (teaching). The third challenge is that ODL education is contingent on the student's individual study motivation, self-study activities and abilities. Every student has one's own frame of thinking, and mode for learning and understanding.

Du et al (2013) further espouse that ODL puts more prominence on "integration than individuation", because all students receive the same knowledge media (printed, visual, or auditory materials) regardless of their individual thinking preferences.

To overcome the above challenges and eradicate the feelings of alienation and isolation in distance education, students should be encouraged to collaborate with one another. Kamel Boulos and Wheeler (2007), argue that the benefits of making connections, even though they may be virtual encourage and motivate students to persevere in their studies.

Online environments offer lecturers in higher education new opportunities for extending their teaching into collaborative modes (Matheson et al., 2012). Furthermore, the social software of Web 2.0 allows students to be connected in ways that allow them to produce content collaboratively online (Parker and Chao, 2007). Web 2.0 technologies, may lead to a metamorphosis from the traditional educator-centred approach to a dynamic learner-centred approach presenting a profound change in the higher education sector (Grippa et al., 2009). Web 2.0, applications take full advantage of the "network nature of the Web: they encourage participation, are inherently social and open" (Ullrich et al., 2008).

There are a plethora of Web 2.0 technologies that can be used to enhance the learning experience. Grosseck (2009), identified blogs, microblogs, wikis, syndication of content through RSS, tag-based folksonomies, social bookmarking, media-sharing, social networking sites and other social software artefacts as specific technologies that can contribute in higher education. The next section provides an overview of the Web 2.0 technologies that can be used on the *myUNISA* platform.

3.1 E-Tutoring using *myUNISA*

Many Internet-based tools are available to the ODL instructor who wants to enrich online teaching and learning strategies. Of these, the Web-log (or blog) is increasingly being employed as a tool in pursuit of collaborative approaches on the *myUNISA* platform.

A blog it is a Website with dated entries presented in reverse chronological order and published on the Internet (Duffy and Bruns, 2006). According to Abdullah (2012), blogs can be used in education in several ways. Some of these ways include an alternative to digital portfolios or as a learning log, to support collaborative work, to reflect on teaching experiences, to categorise descriptions of resources and methodologies for teaching, to communicate teaching tips for other academics, to illustrate specific technology-related tips for other colleagues, to create a common online presence for unit-related information such as calendars, events, assignments and resources and to create an online area for students to post contact details and queries relating to assessment.

Abdullah (2012), further adds that blogs can be used to post comments based on literature readings and student responses and as a collaborative space for students to act as reviewers for course-related materials. A group of bloggers using their individual blogs can build up a body of interrelated knowledge via posts and comments. This might be a group of learners in a class, encouraged and facilitated by an educator, or a group of relatively dedicated life-long learners. Educators can use a blog for course announcements, news and feedback to students. Educators can also use blogs to encourage reactions, reflections and ideas by commenting on their students' blogs.

At present, the blog and podcasts are the predominant Web 2.0 technologies integrated within the *myUNISA* webspace. The ensuing section provides an overview of the reflections of e-tutors regarding the *myUNISA* platform and the use of integrated Web 2.0 technologies.

4 E-tutors reflections on *myUNISA* to promote e-learning using Web 2.0 technologies

At the end of 2010, Senate approved the piloting of e-tutoring at UNISA, to foster tutorial support to students who are unable to attend face-to-face tutorial sessions. As from 2013, all NQF level 5 students (i.e. first year level students) have been provided with an e-tutor to encourage student success interaction. As from 2014, NQF level 6 students (i.e. second year level students) have been assigned e-tutors.

Each module has an online space on the *myUNISA* LMS with a main site for the lecturer to engage with the students and a tutor site for the e-tutors to interact with the students. E-tutors are given complete authority to work on their respective sites.

Students were assigned e-tutors on the first level from 2013 and on the second level from 2014. E-tutors received basic training on the LMS system and the individual lecturers have to monitor their performance and communicate their expectations of the module to their respective e-tutors.

Since this was the first year that e-tutors were appointed with 2013 being a pilot year, e-tutors were asked to relay their experiences particularly with regards to the *myUNISA* LMS system and the use of related Web 2.0 technologies.

Most of the e-tutors stated that they observed a great deal of student participation because students were not receiving hard copies of the study material. The Group site afforded e-tutors the opportunity to interact in their own area without unnecessarily being distracted by "onlookers".

The self-assessment tool and discussion forums contributed to the experience of online teaching. The use of the discussion forums and the announcements options allowed e-tutors to have their hands on the pulse of the students because students can receive notifications whenever e-tutors send out or upload additional material.

Some of the e-tutors stated that most of their communication takes place via e-mails but this can be a lonely and isolated means of communication.

The only social media tool that e-tutors used is the blog tool. Students were given an activity where they had to reflect on their learning experience. E-tutors found this activity particularly useful as it afforded students the opportunity to engage with one another eliminating the barriers of isolation that has been synonymous with distance education. The e-tutors expressed their concern that they could not freely use social networks outside of the *myUNISA* platform since students are in fact using these platforms on a daily basis. This is however a misconception from their side as e-tutors can use Web 2.0 technologies outside of the *myUNISA* platform provided they are used correctly. An example of this can be to use collaborative editing tools and Social Bookmarking tools for collaborative research or using Second Life (SL) for discussion classes.

One of the e-tutors who is also a lecturer at another institution provided an extensive overview of his concept of e-learning that could negatively impact e-tutoring. He espoused that e-learning is the protagonist for innovative change in the educational system by providing the impetus to solve many of the authentic learning and performance bottlenecks facing many educational institutions. For instance, e-learning can be used by lecturers to improve the efficacy of educational interventions in the face of the diverse social, scientific and pedagogical quandaries.

The implementation of e-learning has been generally characterized by massive failure for a variety of reasons, among which are poor student and lecturer educational awareness, low motivation for lecturers to integrate the technology into curricula and poor training arrangement for students and staff. These issues must be adequately dealt with to fully benefit from several opportunities of e-learning.

The e-tutor further added, that the challenges that lecturers are facing in the academic world of today, clearly surpass what their predecessor had faced yesterday. The ever increasing number of students intake and the advances in educational system have considerably increased demands on academic faculty. Lecturers now engage in intensive administrative functionalities than ever before, resulting in less time for teaching, research, innovation and community engagement.

However, despite the enormous benefits often associated with e-learning, there are implementation challenges. Among these are inadequate contributions by faculty members for the adoption of a particular e-learning system, lack of direct involvement of faculty members at the early stage of the system implementation and lack of support for training materials. The primary reason that business information system adoption has failed in many organizations is lack of user inputs, in terms of the fit between the system functionalities and organizational business logics, which eventually has to come from end users and not system developers. In a nutshell, an effective e-learning system should adapt to the user needs and not users trying to adapt to the rigid functionalities that are provided by the system. This is where user inputs at the earlier stage of system implementation become essential.

It can be inferred from the above that a great deal of work has to be done if the e-tutoring project is to be a resounding success. At this stage, e-tutors, have very little knowledge regarding the *myUNISA* LMS system and how to use Web 2.0 technologies to enhance the learning process. Although the blog tool, is the only tool integrated in the LMS, there are a number of other tools such as micro-blogs, wikis, social networking sites, notification and syndicating (publishing) technologies, media-sharing services, social bookmarking 2.0, collaborative editing tools and group work spaces that can be used to promote learning in higher education. Abdullah (2012), provides a comprehensive overview on how these technologies can be deployed as well as the advantages and disadvantages thereof.

5 Conclusion

While technology has an overwhelming impact on higher education, there is still much to be learned about its effective educational contribution. Academics should ensure that they do not focus solely on how a particular technology works but should in essence develop a scholarly approach to using the technology concerned. Therefore it is more important to understand how a particular technology can promote teaching and learning rather than focusing on the technical competencies thereof.

Using e-tutors to promote e-learning requires a sophisticated thinking about the objectives and outcomes of how an educational programme may be designed. Technology can foster new modes of teaching and learning but it cannot in itself ensure that effective and appropriate learning outcomes are achieved. Technology does make a valuable contribution to support student learning, but it is not the technology itself that is the agent of change: it is the educator.

Learning in an ODL context is a daunting phenomenon. Academics should perceptively explore the content of learning material when aiming to promote engagement, motivation and collaboration in an ODL context.

Academics should understand that the students they teach are isolated learners who are impacted by factors such as employment and other responsibilities. They should therefore train e-tutors to make proper use of the *myUNISA* LMS and Web 2.0 technologies to make the learning experience a rich, rewarding, stimulating and participatory experience.

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THE FUTURE IMPACT OF TECHNOLOGY AS WELL AS INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) ON HIGHER EDUCATION

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Abstract

As knowledge-intensive organisations, higher education institutions have been and will continue to be affected by changes and advance in information and communications technologies (ICT) and technology generally for university teaching, research and management. As technology develops and advances, so too does the nature of work. Towards 2025, the work of the university will be affected in terms of delivery, facilities, and provision of courses.

Technology facilitates the entry of new providers to the higher education market. Already in the US, Disney Productions is moving into a market called “edutainment. Globally, various schools are using the commercial Discovery Channel on television as a supplement to their courses. Various futurists forecast that by 2025, students will have “a cyber-literacy which will enable them to access information on any subject in text, audio or visual format”, and in turn they will “demand instruction that is as sophisticated as the TV programming”. This paper will identify key trends and drivers of interest to the higher education sector, under the headings Demography, Society, Technology, Governance, Economy, and Environment that “competes for their time and money”

Keywords

Technology, education and information; communication technology.

1. INTRODUCTION

Automation, robotics, and AI have the potential to transform a number of sectors and eliminate roles in industries as diverse as accounting, healthcare, power, automotive, manufacturing and manual labour industries (Borenstein, 2011). Some estimates suggest that up to 2 billion jobs could disappear from the workforce by 2030 (Frey, T, 2012). The hope is that new industries will emerge to create new opportunities - the concern is that the current educational system is still educating young people for careers that won't exist by the time they enter the job market (Hargreaves, 2005).

Technology is changing at a rapid pace, so much so that it's challenging to grasp. While there is little uniformity in technology, there are some trends worth noting that have spurred tangent innovation, including speed (a shift from dial-up top broad band), size (from huge computers to small handheld devices), and connectivity (through always-on apps and social media). In fact, we have some to expect nearly instant obsolescence—Smartphone contracts that last a mere 24 months seem like ages. Whether this is a matter of trend or function is a matter of perspective, but it's true that technology

is changing—and not just as a matter of power, but tone. In 2014, technology has become not just a tool, but also a standard and matter of credibility. While learning by no means requires technology, to design learning without technology is an exercise in spite—proving a point at the cost of potential and it is difficult to forget how new this is. Fifteen years ago, a current high school sophomore was born. So was Google. It is hard to recall what life was like before Google. What happens to technology in the next 15 years may not simply impact learning in a typical cause-effect relationship. Rather, it might be the case that one absorbs the other, where information access, socializing ideas, and creative collaboration may be organic and completely invisible (Heick, 2013).

The institution that is the university has traditionally played a very important role in society, by “providing access to knowledge, creating knowledge and fostering learning in student to enable them to use knowledge” (Coaldrake and Stedman, 1998), producing some of the greatest minds and leaders in society, and contributing to significant change in the process. Attending university can be a transformative experience in a person’s life, where identities can be shaped and friendships and associations are formed (Pascarella and Terenzini, 1991). University can provide a basis for ‘the cultivation of independent thought, which underpins a healthy democracy’ (Smith and Webster, 1997:29), while also providing learners with the opportunity to develop “the skills of practical reason” (Anderson, 1993:4). Clearly, universities have played a key role in developing and producing great minds and knowledge since their formation (Universities Futures, 2000).

Although higher education institutions have existed for many hundreds of years, they are under pressure to change and evolve in both form and function. These changes will affect curricula, governance, funding, and appointments, as the university is charged with enabling “direct and easy social leverage” for through the provision of ‘useful’ learning. The traditional ‘community of scholars’ however must adapt to pressures from society if they wish to exist in a viable format as a University of the Future, as other providers are now moving into the educational market. Although there are pressures for change, there are also opportunities for higher education institutions. The forces changing the university are often “more than any particular university or notion can address”, yet there are still “spaces for agency – whether it be ensuring that content is more multi-cultural, finding ways for faculty to show solidarity, better meeting the changing needs of students, or creating alternative universities.” (Inayatullah and Gidley, 2000: 2). By engaging Futures strategies now, institutions can plan for the long-term, and influence the future by their choices and actions in the present. This paper discusses the trends and drivers of interest to Universities wishing to act in this manner and to examine the ‘spaces for agency’ and potential formats as a University of the Future. (Finn, Ratcliffe, and Sirr, 2007).

2. DEMOGRAPHIC DRIVERS

Demographic drivers are those pertaining to the “characteristics of human populations, including their size, composition and dynamics” (Giddens, 2001:1 687). As the profile of human populations change, by growing for example, the potential ‘audience’ for higher education will also change. One significant demographic factor affecting participation rates in higher education is the birth rate in a country. A high birth rate means a potentially larger student cohort qualifying and competing for higher education places in future decades, particularly where there is a high participation in secondary and tertiary education. Where there is either a sudden boom or drop in the birth rate, universities will also have to plan for the future by expanding, reorienting, or rationalising, or by attracting international students from countries with an unmet demand for higher education. Demand for higher education is also influenced by the overall growth rate in a population, defined as “the annual changes, and are the result of births, deaths, and net migration during the year” (OECD, 2006a:2).

Dependency ratios are the number of persons aged 65 years or older, as a ratio of the number of people in the labour force (OECD, 2006a). As the dependency ratio increases, more strain is placed on available resources. Dependency ratios may also influence higher education systems in the future, particularly in countries, which are funded to a large extent by the government. Where dependency ratios increase, this will present challenges for governments funding pensions, leisure services and healthcare, alongside higher education. Governments may be faced with a scenario where they will have to choose whether to prioritise investment in the health-care of an aging population over free “third-level education” for younger students who can expect to earn more than their lesser educated counterparts. In an ideal society,

both demands would be accommodated, but in the future, as issues associated with an ageing society become more pressing, universities may find themselves being forced to raise a greater proportion of their funds from private sources, including through fees (Vincent and Lancrin, 2004:249). In ageing societies, higher education institutions will take their place in the funding queue (Newby, 2007).

The World Health Organisation defines Life Expectancy as “the average number of years of life that a person can expect to live if they experience the current mortality rate of the population at each age.” At present in South Africa, life expectancy at birth for females is 81 .0 years and for males, 75.0 years (WHO, 2007). As life expectancy increases in societies, it is expected that the student profile will also change, from young school leavers to mature student’s returning to education or seeking to up skill. Other mature students, retired people for example, may seek learning for the sake of learning itself. This change in profile in the student population will increase the demand for Life Long Learning (LLL), which possibly may not only be provided through university system in the future. Democracy and the natural changes in characteristics of human populations have the potential to impact significantly on higher education systems, as populations rise, fall and otherwise change in profile (Martin, 2005).

3. SOCIETAL DRIVERS

The majority of citizens in industrialized societies assume that they will attend primary school, second-level institutions, and possible third-level institutions. However, formal education delivered in specific premises on a large scale took a long time to become established, and was not always available to society in general. Today, as the nature of work changes, manufacturing techniques are developed and new products emerge, some jobs have simply ceased to exist. In other areas, basic skills have changed so much that Knapper (1985: 23) believes it is no longer feasible to learn them “once during an initial education, and then apply them for the rest of one’s career”. As new knowledge is produced, the ‘half-life’ of knowledge diminishes. The type of knowledge needed by society has also changed, as has people’s desire for quality of life. Traditional students are demanding access to higher education, but so too are workers seeking to adapt to new technologies, to prepare for promotion or to avoid being unemployed. Thus, society in general is seeing the need to achieve higher levels of competence and qualifications. (Finn, *et al.*, 2007).

Today, learning new skills is essential for a citizen to participate fully in society, as well as being a prerequisite for advancement in many careers and professions. According to Duderstradt (2002: 4) a college degree is a necessity for most careers, with a graduate education becoming “desirable for an increasing number” in order to adapt and participate in a high performance workplace. Another profound feature of change in society today is, of course, that it is truly becoming global. Modern societies are undergoing changes, which are bringing about the globalisation of economies, cultures and societies, as “social, political and technological forces are coming together to create a world economy where more countries and regions are taking part in international trade and investment.”

Organisations are now finding finance, markets, and competitors almost anywhere in the world, as society transforms from the industrial Age to the Information Age (Skolnik, 1998:638). Knowledge societies are replacing heavy industry and manufacturing in many parts of the world, so the number of people processing data of some sort in their job has increased significantly. In the future, a country’s economic advantage will lie in their ability to “mobilize, attract and retain human creative talent,” as “wherever talent goes, innovation, creativity and economic growth are sure to follow”, replacing the traditional advantages of “natural resources, manufacturing excellence, military dominance, or even scientific or technological excellence” (Florida, 2005: 13). Globalisation in the marketplace has led an increase in competition in all industries, with the learning industry not escaping this trend (Farrell and Fenwick, 2007:6) believes that the learning industry has in fact been a “primary medium of globalisation and an incubator of its agents” as education is “embedded in particular spaces and cultural practices at every level.” At present, it is estimated that the number of students studying in a country other than their own ranges between 1.5 and 2 million people (Chapman, 2006: 82).

With increasing internationalisation of students, staff and funding, universities have to compete on a global scale for good minds, money, faculty and researchers (Hazelkorn, 2007a), with the notion of ‘brain circulation’ gaining currency as a

‘brain drain’ and a ‘brain gain’ occurs internationally (Hatakenaka, 2004: 3). In the United States, for example, there is a fear that a ‘brain drain’ is about to occur, as the EU science ministers have reached an agreement on research on human embryonic stem cells (Watt, 2006). Increasingly researchers are also paying no attention to national boundaries when seeking out peers or funds to assist them with their endeavours (Newby, 2007). World league rankings for universities are becoming more common, and Hazelkorn (2007a) predicts that a ‘super league of institutions will form, which will be in the best position to attract the best minds, both students and staff. Universities are already under pressure to achieve high places in League Tables and Ranking Systems (LTRS), as this is a ‘Winner-Takes-All’ scenario, where no one remembers who came second in the Nobel peace prize, or who was the second to discover DNA (Newby, 2007).

Public higher education institutions find competing at this level difficult (Hazelkorn, 2007b), and more elite institutions are succeeding and being created, with the ‘accumulation of advantage’ giving certain institutions an obvious lead (Hazelkorn, 2007b). Unless universities can raise the profile of the other activities they are engaged in that do not contribute to their rankings, (for example, Future Studies) can they receive any recognition for this weakness and be ranked more appropriately. Decreasingly diversity has also been linked with increasing government regulation, ‘Imitating behaviour’ and academic drift (Van Vught, 2007). ‘Academic drift’ is the move in academia away from practical or vocational studies, either by students or by institutions. It can result in “more emphasis on academic study and a decrease in the appreciation of vocational qualifications” (Learning and Skills Council, 2007). This pressure to achieve higher rankings internationally, while responding to the needs of society regionally, is also impacting on traditional forms of governance in universities. They are now being challenged to react to the economic pressures of globalisation in a manner similar to how a large corporation would react, by “freezing themselves from uni-dimensional, hierarchical structures which are unresponsive and non-interactive with the environmental change” (Hagen, 2002: 2).

As the profile of university students, and the courses they seek to do, changes, so too does the ‘role’ of the student in the higher education institutions, as they are now contentiously often referred to as ‘consumers’, ‘clients’ and ‘customers’. The shift in education to a consumer-centric model is seen by Skolnik (1998: 643) as the reflection of a “change in the balance of power over content and process of education between institutions and students, but also a fundamental change in the idea of education”. Previously educators were guided by an idea of ‘what students needed to learn’, whereas now students are referred to as ‘consumers’. In the consumer-centric model, Skolnik (1989) described how the driving force in the design of learning experiences “is not a particular educational theory or philosophy, but simply what satisfies the consumer.” As many students are burdened with significant debt in order to fund their studies, it is no surprise that value for money and relevance to the employment market are key concerns for the student-consumer. In turn, there is the type of graduate being produced by universities, as they wish to be able to enter the workplace straight after doing a degree, as opposed to doing a postgraduate course first. (Candy, 2000).

Institutions seeking to attract a more diverse student profile will have to be in a position to cater for their diverse demands. Contemporary adult learners for example, have different demands compared to the ‘traditional’ student. They usually come to a learning situation with “clearly developed personal goals, better formulated ideas about what constitutes useful subject matter, and a desire to learn things that they themselves (rather than a teacher) define as worthwhile, usually because these things can be applied in some way to relatively immediate real-life situations” (Knapper, 1985:50). Mature students may also require more support services than ‘traditional’ students (for example, counselling or special orientation), as they may have had negative experiences in education previously, or it may have been a long time since they studied (Knapper, 1985:51). Their experience of university life is also likely to be different to that of the ‘traditional’ student, as they may not be able to spend as much time on campus, due to demands from children or jobs and so on.

As with demographic factors, changes in society and in societal values and expectations will impact demand for higher education and on its provision in terms of both format and location. The growth of the knowledge Economy and the importance of learning and up skilling are placing great demands on universities to produce graduates who are ready for the workforce, while also able to engage with society as citizens. This increased demand for higher education is both an opportunity and a threat to the university. Where the university is in a position to change and accommodate new approaches to learning and demand, they may meet society’s expectations. Where a university is resistant to change in its approach, it

may risk its demise, as the approach taken by universities in the past cannot simply be scaled-up to meet the size and complexity of future needs (Finn, *et al.*, 2007).

4. THE IMPACT OF TECHNOLOGY AS WELL AS INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT)

As knowledge-intensive organisations, higher education institutions have been and will continue to be affected by changes and advance in information and communications technologies (ICT) and technology generally for university teaching, research and management. As technology develops and advances, so too does the nature of work. Nelson, (1994). The work of the university will also be affected in terms of delivery, facilities, and provision of courses. In 1967, Marshall McLuhan indicated the potential impact of changes in technology when he said, “we shape our tools and thereafter our tools shape us” (cited by Dator, 2002:8). Technology and Information and Communications Technology continue to shape society, societal institutions, and in turn higher education, by changing the nature of work, and thus the type of knowledge needed by learners and society. For Dator (2002:8) technology is a “major agent of social change” contributing to all other “tsunamis” of change experienced by people, as their life cycles are shaped primarily by the life cycles of technologies. Information and Communications Technologies in particular are key drivers in the knowledge economy, and they have facilitated the expansion of both teaching and research, as more avenues open up for their growth (Vincent-Lancrin, 2004:253). Digital technologies are increasing our capacity to “know and to do things and to communicate and collaborate with others” (Duderstadt 2002:8), with IT allowing researchers to “engage in more complex and data-intensive areas of research “(OECD, 2006a:4)

Although advances in technology offer great possibilities for collaboration and expansion for universities, they are also being forced to recognise that they are not the only authoritative providers of information of producers of knowledge available to learners. Opportunities for access to technology and information “pervade our society today,” with the library moving into the average person’s living room (Williams, 1999: 135). It is also relevant that the rate of diffusion of knowledge will only increase as the price of these technologies goes down and technology’s power to deliver information in increasingly more understandable pieces will continue. Chapman (2006:62) questions to relevance of the university as a physical place in the future when the “constraints of time and space – and perhaps even reality itself – are relieved by information technology”, so students no longer have to travel to a physical place to “participate in a pedagogical process involving tightly integrated studies based mostly on lectures and seminars by recognised experts.

Technology facilitates the entry of new providers to the higher education market. Already in the US, Disney Productions is moving into a market called “edutainment (Abeles, 1998:607). One school in Costa Rica is using the commercial Discovery Channel on television as a supplement to their courses (Abeles *ibid*). Sperling (1999:109) predicts that by 2025, students will have “a cyber-literacy which will enable them to access information on any subject in text, audio or visual format,” and in turn they will “demand instruction that is as sophisticated as the TV programming that competes for their time and money”. While the ideal of “anytime anywhere education” already exists, the only doubt may be the quality of this education. For Sperling (1999:109), Information and Communications Technology is the driver which will have “the greatest impact and promote the greatest change” in higher education, ultimately leading Sperling (1999) to conclude that “the consequences of this force are the most difficult to predict”. This is supported by Brint (2002:xiv): “no force has a greater potential to transform higher education” compared to digital learning, it facilitates more creative teaching is delivered through a “mix of visual, aural, and verbal information.”

The conversion of an enormous industry lie into a high-tech format offers significant opportunities for the sale of products and services by commercial enterprises, such as IBM, Microsoft and Apple (Skolnik, 1998:646). This drive also appears to be supported by administrators, as it offers them an opportunity to cut posts and to gain more control over the educational process, while also generating revenue from the “commercialisation of instruction and development of new markets for courseware.” Accordingly academics may be witnessing the early stages of the appearance of a “global knowledge and learning industry, in which the activities of traditional academic institutions converge with other knowledge-intensive

organisations such as telecommunications, entertainment and other information service companies” (Peterson and Dill, 1997 cited by Duderstandt, 2002:7).

Access to the internet through home PCs also offers huge potential for higher education, as the internet “removes almost all constraints on time and space – as well as other legal, financial, physical and social constraints, and allows individuals to take (the) courses at their own pace which from all possible courses in the world best meet their learning needs” (Skolnik, 1998: 641). For the “non-traditional learner, the mid-life learner seeking to upgrade a technical skill or redefine a career to fit the changing economy and the learner whose personal or locational circumstances prevent access to a place-based campus”, the development of online education with considerable potential for access is a “boon” (Chapman, 2006: 62). A situation could arise where a student in Port Elizabeth is tutored by a professor in America, or could do any further if even a portion of the enthusiasm that consumers have brought to using the internet and email is brought to the idea of taking courses through these means, then the response of learners to 21st Century opportunities for electronically delivered, self-directed learning could be vastly greater than responses to educational technology in the past.

Certainly e-learning is already becoming a more prevalent feature in the higher education landscape. For example, the European Commission sees its e-Learning Initiative as playing a part in speeding up changes in the education and training systems in order to facilitate Europe’s move to a knowledge-based society (EU, 2007b). E-learning is also becoming a major provider of distance learning, whether through the web, mobile or other technologies, and is “increasingly complementing traditional face-to-face education” (Vincent-Lancrin, 2004:253). The proliferation of mobile technology may also lead to fundamental changes in how students are examined, as the ability to perform in a closed-book situation may become completely irrelevant for the student who is always “connected” to information through mobile or laptops in cafes (Norton, 2007b).

The delivery of higher education through technology in particular Information and Communications Technology would require countries to have high levels of access to broadband. In Singapore, for example, every business, school and home is connected to Singapore One, a national broadband network. The delivery of education through technology is not without its critics. Inayatullah and Gidley (2002) outline responses from commentators on the commodification process universities are undergoing, and the introduction of the internet. While none of the commentators were “Luddites”, “they are cautiously optimistic about the role of the internet, it may also continue to distance teacher from student, knowledge from ethics”. Some commentators are concerned with content, others with ‘the process of education’ and others with ‘the political economy of knowledge’ (“Who gains and losses when structures of education change?”).

Technology in itself is “neither good nor bad,” as it is the way in which it is used that is of significance. In order to benefit from technological developments, education needs to understand the relative education strengths and weaknesses of different technologies, and what needs to be done to use technologies effectively. As technology changes and develops, it has the capacity to reduce work in society generally, and specifically in higher education. Technology will lead to new means of delivery, as well as facilitating the entry of new higher education providers in the market. As students become more computer literate, there will be pressure on all higher education institutions to upgrade their technology, particularly in knowledge-dependent economies and sectors, where industry-level equipment and knowledge will be prerequisites to produce skilled graduates. Those institutions or countries, which do not invest sufficiently in new technologies, could find themselves falling behind their competitors. Changing technologies will impact on societal expectations, student populations, faculty roles, financing and accreditation. Equally, one of the largest challenges facing each higher education institution is that of determining how much space, and of what type, it will need in the future. Estates infrastructure decisions are thus far-reaching and long-lasting.

Dolence and Norris (cited by Skolnik, 1998:638) have a final warning for those higher education institutions which choose to ignore the impact of technology: “those who realign their practices most effectively to Information Age standards will reap substantial benefits...(while) those who do not will be replaced or diminished by more nimble competitors”. Similarly, from Harrison and Dugdale (2003), a prediction, in terms of space and the potential of the “virtual estate” in

indicating that “increasingly organisations (such as universities) will move outside of the physical container of their own buildings”.

5. GOVERNANCE

Governance refers to “the set of arrangements by which the affairs of an institution are ordered” (Adendorff, 2011) or “the act of affecting government and monitoring (through policy) the long-term strategy and direction of an organisation. In general, governance comprises the traditions, institutions and processes that determine how power is exercised, how citizens are given a voice, and how decisions are made on issues of public concern” (Adendorff, 2011). Synergies between higher education institutions and commercial organisations are becoming a more common feature in the contemporary higher education landscape. As a producer of knowledge, universities often carry out research of commercial value, which can be capitalised on, through patents or through linking with commercial organisations to bring innovations to the market place. For industry, collaboration with a university offers them interdisciplinary which they would otherwise find expensive. Universities for their part can benefit from commercial liaisons through patents and potential income streams (Throne, 1999:9). If commercial value, which can be capitalised on, through patents or through linking with commercial organisations to bring innovations to the market place. For industry, collaboration with a university offers them interdisciplinary which they would otherwise find extremely expensive. Universities for their part can benefit from commercial liaisons through patents and potential income streams (Thorne, 1999:9). Vincent-Lancrin (2004:253) points out that the involvement of commercial interests in the production of knowledge in higher education institutions could lead to intellectual property rights issues, as patenting of knowledge conflicts with its teaching.

Students also benefit from industry partnerships, as in smaller institutions, both urban and rural, industry partnerships are seen as a key element of success. Students spend part of their time in enterprises under the supervision of their teachers, with enterprises contributing to instructions through their staff teaching in them. This mutually beneficial relations is “Service Learning’, which is “a form of experiential education that uses community service experiences to enrich and expand academic scholarship” (Martin and Haque, 2001:5). A good example of this is seen in the German Fachhochschulen (OECD, 1998a:34). Student learning has also been shown to be more relevant to society’s needs when they are learning from academics who are engaged and working with “real world issues” (Hatakenaka 2005:3). As universities are forced to find more diverse streams of income, professionally-oriented postgraduate degrees, where students earn their qualification while working in a company, with the company paying part of the cost as the student addresses some problem they face, may play a greater part in the higher education landscape of the future (Lindqvist, 2007). However, service learning has been found to be very time-consuming, where it is not administered and organised effectively (Martin and Haque, 2001:8).

Research partnerships are also becoming a more common feature in higher education, as institutions and organisations work together to achieve critical mass to attract funding and to pool resources. (Etzkowitz, and Kemelgor, 1998). These partnerships are increasingly becoming international partnerships. Changes in governance and management of universities will inevitably lead to change in the role of academics, often potentially dramatic changes, as they struggle to balance the demands of teaching with research and publishing, all within a framework of significant institutional change. “Learning Outcomes” are also becoming a deliverable of higher education, requiring restructuring of programmes and teaching methods by academics. (Hall, and White, 1997). The rate at which knowledge changes in a particular profession or discipline will have a significant impact on the future role of the academic. As the half-life of information decreases, academics are being forced to consider to what extent their own learning “is greater than or equal to the rate of change” (Cormack, 1999:125). For example, over recent decades there has been a shift from Pharmacology to Genetics in future healthcare and from PCs to the internet in the computer industry. Many Professors are not ready to change their method of instruction to adapt to new technologies, and they will need to upgrade both teaching skills and attitudes, with support from higher education institutions (Klem, 1999). Even the ‘super educated’ need to re-skill, even if this is simply engaging with new software such as Power Point (Newby, 2007).

It is also believed by some that academics may have to accept that subjects taught and validated outside the university, by capable professionals, are equivalent in academic quality to their own teachings and services (Williams, 1999:137). Changes in society generally are bringing about changes in the governance of higher education institutions, and in turn in the role of academics. Where institutions are dependent on state funding, or where the state wishes to develop or maintain an innovative future knowledge orientated economy, the autonomy of the university is threatened, as they are expected to behave in the same manner as a corporation faced with different threats. Meyer, *et al.*, 1997).

6. ECONOMIC DRIVERS

Knapper (1985: 45) outlined that, higher education was restricted to a narrow spectrum of the population in almost all cultures. However, as economies become more dependent on innovation for their success, higher education became an increasingly important factor for economic development. Universities are finding themselves part of a “knowledge-intensive industry”, where the boundaries between classical and technological education are gone, and the future study interdisciplinary is now required (Hazelkom, 2007a). As markets become increasingly globalised, individuals are finding themselves under pressure to have a higher education qualification to compete in a global economy, leading of higher education becoming universal and compulsory, which in turn impacts on higher education institutions in terms of form and function.

As the aim of universal primary education is achieved in transition and developing economies in the coming decades, there is likely to be a significant unmet demand for secondary and tertiary education in these countries, as they try to develop their economies (Vincent-Lancrin, 2004:249). With the increased demand for higher education, it is also becoming a big business. Many analysts believe that education will emerge as one of the leading investment sectors of the next twenty-five years, in response to the changing demand for skills in the economy. The 2005 World Report on Knowledge Societies (cited by Georghiou and Cassingena Harper, 2006:3) outlines how changes in society are now putting higher education at risk of ‘commoditisation’, particularly in countries lacking a university tradition, as knowledge societies lead to the emergence of full-scale markets in higher education.

While universities may seek to provide a well-rounded education and produce balanced graduates capable of abstract thought and possessing key skills, policy-makers and employers are concerned that education and training programmes correspond with a country’s economic profile and employment demands. In times of rapid social and technical change, actually achieving a match between the priorities of educators on one hand, and employers on the other, is very difficult. As society, moves from manufacturing towards knowledge economies, dependent to a considerable degree on innovation, universities have a significant role to play in future economic development, with the economy in turn placing pressures and demand on higher education systems for graduates with interdisciplinary skills, and industry-relevant knowledge. Universities are also being called on the behave in the same manner as a business, a move which often conflicts with the core values of the university in its search for “unfettered, curiosity-driven intellectual inquiry” (OECD, 1998a:10).

As technology advances and changes the nature of work, and as industry and the economy demand new skills in all occupations, a flexible workforce will be needed to compete on a global scale, “with emphasis on generic skills such as communications and customer service, on more technical skills such as IT skills, and on maths and future orientation science skills” (Leitch, 2004:136).

7. ENVIRONMENTAL DRIVERS

Human activity has had a significant impact on the environment and its resources in the past two centuries. Many of these impacts, however, have been negative, leading to environmental crises such as climate change, threats to biodiversity and exploitation of resources and people. The UN Economic and Social Council (ECOSOC) as well as RIO + 20 (2012) sees no major change occurring in the unsustainable pattern of consumption and production putting the natural world in peril since discussion of the issues at the United Nations Conference on Environment and Development (UNCED Earth Summit, 2012)

As poorer nations race to keep pace with the industrialised lifestyles of the Western world, the extent of the impact of man on the natural environment will intensify, unless there is a significant shift in attitudes and behaviours towards protection of the environment, which in turn will influence higher education policy and content, as society in general would require a different kind of graduate (University Futures, 2007). For example, to deal with any future environmental crisis or pressure, society will need professionals skilled in environmental management and protection. To deal with issues such as food poverty, society would require scientists and researchers focused on developing more resistant crops and effective methods of dealing with pests or water shortages (Meinzen-Dick, 2004). Crises such as climate change or fuel shortages will lead to a demand for research into renewable and sustainable technologies, with professionals working in complementary fields, such as architecture, construction management, engineering also needing to be trained in sustainable building techniques (University Futures, 2007).

In spite of the wealth of information of Environment Education (EE) or Education for Sustainable Development (ESD), there appears to be a dearth of information on the impact of the environment on tertiary education directly, in this, the United Nations Educational, Social and Cultural Organisation's (UNESCO) and the Decade of Education for Sustainable Development (DESD). In their OECD study on higher education institutions contribution to regional development, Puukka and Marmolejo (2007) also found that contributing institutions and countries did not explore the issue of environmental sustainability to any great extent. The institutions' contributions to social, cultural and environmental development was 'often neglected', with their role as 'good citizens' not being fully undertaken (University Futures, 2007). This lack of research on sustainability by and about higher education institutions may be more of a reflection of researchers' interests, or funding constraints, than a statement that environmental drivers do not affect higher education providers. Perhaps it is the case that higher education institutions are unsure of the direct impacts of these issues on their operations. Some of the significant potential effects of environmental trends are outlined below (Hinton, K, 2012).

As environmental crises become more of a concern to society and to governments, there is potential for further growth in the field of Environment Education / Education for Sustainable Development in tertiary education. The importance of the discipline of Environment Education / Education for Sustainable Development has been expressed many times by influential organisations, such as the International Union for the Conservation of Nature and Natural Resources (NGOs) and governments concerned with conservation (Palmer, 1998: 5). The importance of the field of Environment Education was reiterated by the UNESCO Biosphere Conference in 1968, as the conference called for training, teaching materials and global awareness of environmental problems (Palmer, 1998), and at the UNESCO / IUCN International Meeting on E in the School Curriculum in Nevada in 1970, where the 'classic' definition of Environment Education was formulated.

Time and time again, key programme and publications re-reinforced the importance of Environment Education / Education for Sustainable Development (for example, the United Nations Environment Programmes (UNEP); the Belgrade Charter (1975); the UNESCO Inter-governmental Conference on Environmental Education in Tbilisi in 1977; the publication of the World Conservation Strategy (1984) by the IUCN, UNEP and the World Wildlife Fund (WWF); the publication of the Brundtland Report, 'our Common Future' (1987); The Earth Summits in Rio (1992) and Johannesburg (2002); and Rio+20 (2012). The world Commission on Environment and Development Education sees education as playing a key role in helping people become more readily able to deal with environmental and social problems, such as overcrowding or elevated population densities (R10+20, 2012).

At present, issues such as sustainable development and environmental protection do not have the priority one might expect in a world facing global climate change. Despite the fact that the economy is 'a wholly owned subsidiary of a natural ecosystem' (Ehrlich, 2001), the economy is often prioritized over the environment in industry, government and education. In future, however, the environment may play a greater role in universities, as they search for solutions to man's problems - "the planet itself calls for healing, in desperate need for solutions from the university" (Inayatullah, 2007). The New Zealand Parliamentary Commissioners for the Environment (PCE), Dr J. Morgan Williams, believes that universities must respond to environmental crises by providing leadership, so that the next generation of leaders are capable not "critical, creative and future thinking skills; needs assessment and action orientated skills; interpersonal and intellectual skills; (and)

skills to deal with complexity and uncertainty”, so there would be the possibility of environmentally sustainable societies developing in the 21st century (Morgan and Williams, 2001)

In particular, in the area of the built environment, the natural environment could become a significant driver affecting curricula. On a global scale, buildings have a significant environmental impact. The higher Education Environmental Performance Improvement report (HEEPI, 2007) outlines how construction accounts for 40% – 3 billion tonnes – of the total flow of raw materials (primarily stone, gravel, sand, clay iron ore and other quarried products)“ into the global economy every year. The construction and operation of buildings worldwide accounts 25% of all virgin wood use, 40% of the total energy use, 16% of total water withdrawals and generates enormous quantities of solid waste”. In light of such impacts, both Industry and universities concerned with the built environment will be affected by any environmental policies or regulations developed to reduce resource consumption, save energy or avoid environmental impacts, as improving graduates’ and construction managers’ understanding of these issues could lead to significant improvements in the environmental performance of the construction industry (Cotgrave and Alkhaddar, 2006). The appropriate curricula could be negotiated, with academia, government industry and industry professional bodies all playing a part. A new approach to sustainable development is essential in higher education generally, as “the volume of education continues to increase, yet so does pollution, exhaustion of resources, and the dangers of ecological catastrophe. If still more education is to save us, it would have to be education of a different kind; and education that takes us into the depth of things” (Sterling, S, 2010).

Requirements for organisation and industry to comply with regulations, or to achieve standards such as EMAS or ISO certificates standards; means that industry and employers require trained, knowledgeable graduates, which in turn will impact on higher education institutions in terms of course provision and facilities. There are calls to restructure all higher education courses to include Education for Sustainable Development, which are supported by the corporate sector as it seeks graduates with the personal and professional knowledge, skills and experience necessary for contributing to sustainability (Tilbury and Cooke, 2002). Tilbury and Cooke (2002) also found at one university- industry summit, that corporate stakeholders argued that every student, irrespective of specialism, should have the opportunity to learn about sustainability in higher education.

The potential of the environment to impact on third-level curricula depends to a large extent on societal value systems. A 2005 study of attitudes to the environment in the EU found that almost 90% of Europeans in 25 countries believe that when making decisions, policy-makers should pay as much attention to environmental issues, as to economic and social factors (EU, 2005b). The state of the environment (72%) was cited as influencing quality of life to the same extent as social factors (72%) and only slightly less than economic factors (78%). 85% of Europeans feel that they make an effort to care for their environment, but over half (57%) believe that industry, corporations and individuals must also all play a part to prevent environmental degradation (EU, 2005b).

Where societal value systems prioritise the environment, this in turn could effect change in higher education institutions. If society was willing to pay more taxes for environmental remediation, for example institutions should be in a position to react to this change in value systems to ensure that their courses and research are designed to respond to, and take advantage of, this. In the face of a shift in societal value systems, government and industrial funding could become oriented towards projects promoting more effective environmental management. Curricula may be designed to focus more on problematic aspects of man’s activities, such as agriculture, waste management, transport and urbanisation. Shortages of graduates with key environmental skills to cope with societal demands for solutions to environmental problems may reach crisis point in the future, if there are not enough qualified graduates being produced. Teichler, and Kehm, (1995).

Children and young people are irreversibly affected by economic, social and technological developments (OECD, 1991:11), so it is crucial that they are quipped to cope with the challenges ahead of them. Filho’s study (1995:6) of children’s attitudes to the environment found they had a very high level of interest in environmental issues. 62% of children were ‘very concerned’ about environmental issues, 30% were ‘a little concerned’ and only 8% had ‘no concern’ at all. The degree to which children are exposed to environmental issues and citizenship may be reflected in their choice of college

courses when they leave school. The task of equipping children and young people for future environmental challenges may also fall to higher education institutions in the years ahead. (Glenn, & D'Agostino, 2008).

Environmental drivers therefore have the potential to impact on higher education institutions in a number of ways, be it through course content to keep abreast of current best practice or regulations, or to comply with regulations pertaining to higher education institutions. Of the six key drivers affecting change in the higher education landscape, there is less literature available on the impact of the environment on the future of the university. This may be an indication of how unnoticed trends in the present emerge as all-encompassing in the future. As environmental crises become ever more pressing, the economy and all which depends on it may be forced to re-orient their approaches as issues of sustainability become more urgent. Such a significant change in societal and economic values would inevitably impact on the services and mission of the university in the future.

8. CONCLUSIONS

The drivers discussed in this paper leave much scope for different directions in higher education. One factor in common for the majority of commentators cited is that traditional universities and higher education institutions are to undergo change to survive in a more competitive education marketplace. In this changing world, futures studies can assist higher education institutions in avoiding “undesirable situations and to encourage post-secondary systems to adopt appropriate strategies” (Vincent-Lancrin, 2004:246, Rao, 2003).

According to Clark (2005:169), many traditional universities will continue to operate in an ‘old-style’ mode for as long as they possibly can. Shattodck (2002, cited by Clark, 2005:170-171) supports this, as he believes that cultural change in traditional universities is very difficult to realise, and the traditional structures can remain in place long after they have outlived their function as:

....when any issue comes up the first solution is the old solution.... (and) when push comes to shove, universities can always find friendly benchmarks that provide soft landings in self-esteem and public reputation. In the comfortable old family – other places like us – they will to change slackens. Lowered expectations become self-fulfilling.

Clark (2005) also believes that many of those universities which do attempt change will not be proactive enough, as they will find “one or another rationale for inertia: traditional ways will certainly prove best over the long term”. In a changing educational landscape, these universities may find themselves having outlived their usefulness and thus their ability to compete for funding. When interviewed about the fate of the ‘traditional’ university, one leading Oxford professor and founding member of the Manchester Business School indicated that he believed that such universities were “unreachable” as universities in general had “lost their intellectual monopoly,” as people outside the university worked in “similar ways and with similar talents”, but not limited by “academic traditions, preconceptions and institutions” meaning that “for the first time there are more clever people outside universities than inside” (Hagen, 2002: 2).

Stakeholders outside universities are increasingly conscious of the change occurring in society and in their own work environment, and they will “deepen their expectations that universities should also change and at a quickened pace” (Clark, 2005:170) to meet new demands arising in society. The changes occurring in governance in venerable institutions such as Oxford, illustrate that even the most traditional of institutions must react to the changes in their midst, or “as others move forward, a university may find itself standing still on a down escalator,” but the same commentator also finds value in the metaphor of a “steady state of institutional change” (Clark, 2005:169).

For Abeles (1998:603-614) the traditional university is facing its demise, followed by its subsequent rebirth. Universities are losing the battle to produce short half-life knowledge (with a short use-by-date) to other institutions, because of the infrastructure costs compared to the costs of virtual space. The university needs to return to the core business of providing long half-life knowledge, having the ability to synthesise and produce wisdom in order to be ‘reborn’. Duderstadt (2002:10)

believes that for the near-term ‘traditional’ universities will continue to exist much in their present form, although to meet the challenges of new players in the education market, “significant changes” will be necessary in how universities teach, conduct scholarship, source funding, and embrace the future.

Many commentators have predicted that the University of the Future will not occupy a campus in the traditional sense – there will be no football team or library building for example, because new “open and accessible alternative sources of authority of knowledge”, such as the internet or the television, can provide learning and skills without the need for the traditional physical campus (Smith and Webster, 1997:25), bringing about the “death of distance” as it is no longer a constraining factor for potential students (Chapman, 2006:63).

As outlined above, the demands of students are likely to change as the profile of the student body changes. The ‘new’ student is part of an iGeneration or Generation Z, which may demand a new way to learn, with mobile learning becoming a feature used to improve the learning process (University Futures, 2007b). Sperling (1999:109) also believed that ICT would facilitate universities being communications hubs, packaging information for students through a variety of channels and media “many, if not most, not yet invented or imagined.” Advances in technology feature strongly in predictions of the demise of the university campus, as technology becomes a facilitator for alternative means of delivery of learning and skills. Anywhere a student demands access to a higher education institutions in 2025, they will simply have to connect to the internet “thus rendering the need for the traditional physical campus obsolete”, as higher education is provided through mega institutions with “global information/intelligence/knowledge” systems accessed anywhere learners have a digital connection (Sperling, 1999:109). Already MIT has posted all of the syllabi, lecture notes, exams and other material for its 2000 courses on the internet, so that individuals not actually enrolled in MIT can access the material to “disseminate new knowledge and content, at no cost... as learning resources” (Chapman, 2006:55). Other universities have followed suit to different degrees. Of course to benefit from these developments, the potential student does need to be well enough off to own a computer with access to the internet, or they must have access to a library with such facilities. In spite of the changes in higher education and the concern for ‘access’ for all, many potential students will not have the opportunity to access higher education wherever or whenever they want to due to their circumstances and financial limitations.

The prestige attached to a well futures orientated physical campus may also ensure its existence in the future, if even for the opportunity it affords visiting dignitaries and politicians to ‘hold court’ in prestigious locations. In this respect, universities are “prestige-maximisers” who use this to control both state and market influences (Clark, 2005:169). For example, Warwick University hosted a visit to the then Prime Minister Tony Blair and President Bill Clinton when they met in December 2000 (Smith, 2007:21). Every institution has its own ‘story’ to tell, about “its mission, its history, its traditions, its aspirations” (Chapman, 2006), with the campus acting as a “tapestry of sensory, cognitive and intellectual experiences that are meaningful in and of themselves, and that can profoundly reinforce one another” and this capital can be used to a higher education institutions advantage.

Sperling (1999) has also predicted that not only will physical campuses be in existence in 2025, many of them will be mega universities, and they will be in the developing world. He predicted that the China TV University will have 53,000 students; Anadolu University in Turkey will have 520, 000 students; Terbuka University in Indonesia will have 350,000 students, and the University of California will have 157,000 students. The State University of New York is predicted to have 400, 000 students, with the City University of New York having 350,000 students, among other potential mega-universities in the world. Through Information and Communication Technology, the reach of great research universities will increase, but they will still be “site based with tenured, full-time faculties of scientists and scholars teaching and pursuing, alone or in small groups, their accustomed subjects and research concerns” (Sperling, 1999:104). Those liberal arts colleges which have established national reputations will not undergo significant change, but non-elite HEs, whether state-operated or not-for-profit will undergo considerable change, driven by competition with new publicity-traded education corporations. Sperling (1999) also predicted that for the most part, these educational bureaucracies will be administered by the state, but private universities will also exist. These private universities will range from the “great research universities of Europe, Japan and the US, to small private colleges, whether mundane or elite, that serves specific

micro-populations". Sperling (1999) further believes that new institutions, which are barely on the educational radar at present, will emerge as major players in higher education in the future.

Elements of Sperling (1999) and Vincent –Lancrin’s (2004) forecasts are supported by Inayatullah (Inayatullah and Gidley, 2000) who predicts three spaces for the university of the future. They are elite brand name universities, which expand outwards due to the influence of globalisation and virtualisation; convenience mega universities, which deliver courses in a flexible manner, and thus attract the bulk of the world’s students; and the smaller niche universities, which focus on “multiculturalism or regional and local concerns”. Cormack (1999:123) believed that “the university of the future will undoubtedly have new and different competitors” for students, staff and resources. Technology, in particular, allows new players to move into the higher education market, as the exponential pace of evolution associated with technology allows new higher education providers access to students in their homes and through mobile technology. It is predicted that the number of people linked by digital technology will grow from millions to billions, and society “will evolve from ‘e-commerce’ and ‘e-government’ and ‘e-learning’ to ‘e-everything’ since digital devices will increasingly become our primary interfaces not only with our environment, but with other people, groups and social institutions” (Duderstadt, 2002: 10). The impact of IT is likely to be ‘profound, rapid and discontinuous, just as it has been and will continue to be for the economy, our society and our social institutions’.

Already new ‘virtual’ players are making themselves felt in the higher education landscape. For example, the Knowledge University, which was formed in 1996 with an initial capitalisation in excess of \$500million; and having the aim of providing a broad range of services and products to serve lifelong education needs. An interesting feature of this institution is that it has strong relationships with the world’s leading entertainment, telecommunications and technology companies. As a private company, Knowledge University is in a position to develop creative structures and long term relationships, and has a management team described by Fortune magazine as “stellar” (Cormack, 1999: 124). Such private providers of higher education with management from business may become more common higher education providers to student consumers. (Dill, 1997).

There is already a move underway in higher education towards competency-based awards, which would challenge the monopoly of the traditional university, as informal learning becomes formally accredited, instead of learners having to accumulate units or credits. The Western Governors University in the UK, for example, has competency-based programmes, so that learners can take independent study classes, build a portfolio and take exams in areas where the learner has already a level of expertise and skills. In the future, more higher education institutions may award degrees based on the knowledge a student has built up, regardless of where that knowledge came from, be it from work experience, life experience, or from previous education (Farbman, 1999: 72). If more awards are given based on competences, as opposed to ‘seat time’ and accumulation of credits, this will affect traditional higher education institutions, as they will have to develop frameworks to accommodate this type of credentialing.

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PROPOSED COUNTERMEASURES TO REDUCE THE CYBER DIVIDE – A SOUTH AFRICAN PERSPECTIVE

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Abstract

The digital divide has been a problem since the early days of information and communication technology (ICT) and it manifests itself in many forms, for example in a lack of access to the Internet, inadequate ICT skills and lack of language proficiency. Despite sustained efforts in the developing nations to reduce this divide, countries like South Africa still continue to suffer from the effects of the digital divide. In the current research the term ‘cyber divide’ is referred to as the divide that exists in a cyberspace. The cyber divide is an aspect of the digital divide that affects people in the cyber community or people who wish to operate in cyberspace (defined in this research as potential cyber users). In an attempt to bridge the digital divide in South Africa, this research is proposing a framework (cyber education framework) that should be considered as a possible countermeasure for decreasing the cyber divide in developing countries with particular reference to South Africa. The purpose of the proposed framework is to shift emphasis slightly from access divide to language and skill divide. Since the former has received numerous attentions since the early days of digital divide. This research project is a two-phase process. The first phase, which is this article, focuses on proposing the framework while the second phase will be the implementation and evaluation phase, which will be a future work.

Keywords

Digital divide, Cyber divide, Cyber users, Language divide and Rural communities

7 Introduction

The Internet plays an important role in our everyday lives, not only at the workplace, but also in the homes of many people around the world (De Lange & Von Solms, 2012). Access to the Internet has transformed the way we work, socialise, discover and disseminate information. However, it can be argued that despite its rapid growth, access and use of the Internet are still not distributed equally around the world (Guomundsdottir, 2005; Haseloff, 2005; Wijers, 2010). This unequal distribution of access and use of the Internet is partly due to the language background, economic factors, lack of digital skill, and lack of elementary digital experience of the Internet users, hence the term digital divide. Digital divide refers to gap amongst and within countries, individuals, households, businesses and geographic areas. The gap exists at different socio-economic levels and concerns both peoples’ opportunities to access information and communication technologies (ICTs) and their knowledge and use of the Internet for a wide variety of activities (Oecd, 2001; Smith, 2003).

Over 70% of Internet content today is in English (Khan, 2011). This means that people who do not speak English are at an enormous disadvantage as they are being left out from major part of the Internet benefits. This is referred to by Khan as language divide (Khan, 2011). Countries, particularly developing countries such as South Africa (where some members of communities especially in the rural areas struggle to communicate in English), continue to suffer from this language divide (Kouadio, 2008) that exacerbates the digital divide. In this research the focus is on developing countries such as those on the African continent, with particular reference to South Africa. Hence the term ‘developing countries’, ‘Africa’ and ‘South Africa’ are used interchangeably in this paper. In developed countries such as the United States of America (where English is the main language), a substantial part of the population has access and knowledge of the Internet because they have more infrastructures, and speak and understand the language in which Internet content is made available (English). This is not the case in developing country like South Africa (Haseloff, 2005) that consists of 11 different official languages with English being the mother tongue of less than 10% of the total population.

Internet usage is currently growing fast among non-native English speakers (Gandal, 2002). However, this excludes the African native (not colonial) languages. The current Internet world statistic 2012 Report shows that the top ten languages used in the Internet are: English, Chinese, Spanish, Japanese, Portuguese, German, Arabic, French, Russian and Korean (“World Internet Users Statistics Usage and World Population Stats,”). None of these languages is an African native language. This confirms that the language divide has been and still a great contributor towards the digital divide in country

like South Africa that has 11 official languages. The vast majority of South African population particularly the illiterate ones in rural communities and some literates in language other than English communicate in their native languages.

In South Africa, particularly among the less educated in rural communities, only a fraction of people have access to the Internet or the necessary skills to use Information and Communication Technology (ICT) devices which is a powerful tool in our changing world (Guomundsdottir, 2005). The unequal distribution of the Internet intersects with issues of race, class, gender, income, nationality, age, education and lack of English proficiency (Fuchs & Horak, 2008; Haseloff, 2005; Kouadio, 2008).

Efforts made towards bridging the digital divide are focused on reducing digital access divide. Recent literature has shown that bridging the access divide on its own does not entirely solve the problem as many other divides began to emerge as the use of computer and the Internet increases (van Dijk, 2006). It therefore stands to reason that the emphasis need to be shifted to the many other divides such as languages which are barely noted and have not been talked about much in the literature (Keniston & Kumar, 2003), particularly in Africa (Guomundsdottir, 2005; Mwesige, 2004). For this reason, it is crucial to consider the concept of the language divide as one of the essential factors underpinning digital divide.

This article is aimed at proposing a framework that might be considered as a possible countermeasure for decreasing the cyber divide among potential cyber users in developing countries, particularly in the South African context. The framework proposed in this work shifts emphasis slightly from access divide which has received numerous attentions since the early days of digital divide. This research project a two-phase process. The first phase, which is this article, focuses on proposing the framework while the second phase will be the implementation and evaluation phase, which will be a future work.

The term 'cyber space' is briefly examined in relation to its notion, benefits and challenges. The reader should note that in this research, the term 'cyber' was construed to mean the same as the term 'Internet'.

8 Cyber space

According to Dodge & Kitchin (Dodge & Kitchin, 2001), cyber space is the digital zone within which computer systems connect with one another. It is a multidimensional and artificial expression of 'virtual reality' (Talmud & Mesch, 2003) Cyber space exists through the operation of the Internet and hence knowledge of the Internet is paramount in order to navigate in cyber space. The notion, benefits and challenges of cyber space can be properly comprehended through an examination of the Internet.

The Internet has for years been recognised as an important mechanism for transforming various aspects of human life, and it has had a particularly large impact in the medical, social and economic fields (Baker, Wagner, Singer, & Bundorf, 2003). The use of the Internet as a source of information relevant for the fulfilment of human needs has become increasingly popular as more people go online. There is no doubt that the Internet has created new channels of communication, access, sharing and exchange of information among users. Although it is impossible to accurately predict its further evolution, recent developments indicate that the Internet is having a profound effect on the way people fulfil their educational, social and economic needs. Unfortunately, many people still do not enjoy the luxury of using the Internet. One should not assume that the rapidly increased use of the Internet implies that access and the use of the Internet is distributed equally around the world (Keniston & Kumar, 2003). The digital divide remains a reality in numerous developing countries which influences the extent to which members of these countries take part in activities within cyber space. However, it should be noted that efforts have been devoted towards reducing digital divide.

9 Efforts towards reducing the cyber divide

Various efforts have been made towards bridging the digital divide in developing countries like South Africa. Examples include: the digital doorway initiative by Meraka as part of South African Government strategic mandate for ICT development under president Thabo Mbeki in 2002; one laptop per child (OLPC) project; Internet café initiative; schoolNet project and Lenland initiative (Abbas, Vyver, & Marais, 2013; Kraemer, Dedrick, & Sharma, 2009; Kraemer, Dedrick, & Sharma, 2011; Mwesige, 2004). However, these existing efforts are largely directed at bridging the access divide by providing access to public computer centres and the Internet. Many believed that the concept of the digital divide relates only to unequal access to technologies hence they understand the digital divide as revolved mainly around access to a computer and the Internet (De Lange & Von Solms, 2012; Mariscal, 2005). The understanding of these authors is that decrease in the access problem will automatically result in the decrease in the use of computer and the Internet. On the contrary, literature has shown that bridging the access divide on its own does not entirely solve the problem since many other divides began to emerge as the use of computer and the Internet increases (van Dijk, 2006). Therefore, there is need to shift emphasis to many other divides such as language which is a strong factor that correlates with the use of the Internet (Warschauer, 2013). Language divide is hardly considered and has not been discussed much in the literature (Keniston & Kumar, 2003; Khan, 2011), particularly in Africa (Guomundsdottir, 2005; Mwesige, 2004). It is then crucial to consider the concept of the language divide as one of the important aspects of digital divide.

Focusing on a language divide will help in bridging the cyber divide gap that exists among people in rural communities who communicate only in their native languages. Notwithstanding that material access to the Internet in South African rural communities is still a challenge and efforts are being directed to solve this, efforts should also be made towards providing basic cyber awareness, skill and education to the people in rural communities in their native languages. This will prepare them to become literate cyber users. The aim however is to prepare people from rural communities to make effective use and take advantages of the Internet as it slowly penetrates into their communities. This approach will help prevent the problem of having Internet access without the necessary skills and knowledge on how to use it.

Addressing the issue of language divide is fundamental in improving usage of the Internet particularly in the rural communities in South Africa. This is even more crucial knowing that cyber space is a complex environment that has the capacity to improve people's experiences and activities, but can also place individuals in a vulnerable state (Grobler & Vuuren, 2010). Hence the analysis of the problems and challenges that confront particularly South African communities in this Internet age becomes critical to achieve equitability in the cyber space.

10 Problem statement

Studies conducted on cyber usage in South Africa indicate an increase in the population that can access the Internet, particularly through the use of mobile phones (Kreutzer, 2009; Lewis, 2005; Longe, Ngwa, Wada, Mbarika, & Kvasny, 2009). However, recent research by Oyedemi demonstrates that limited Internet access and usage in South Africa is still a problem that particularly affects people in rural communities and in the informal settlements (Oyedemi, 2012). Also according to the World Internet Users and Population Stats, South Africa's Internet penetration rate is 17.4%, which constitutes only 5.1% of the entire number of Internet users in Africa ("World Internet Users Statistics Usage and World Population Stats").

The above statistic also depicts that even though the penetration percentage and the number of Internet users have increased, the cyber divide still remains a problem in South Africa (Oyedemi, 2012). The problem of Internet access and use in South African rural communities is a true reflection of the existing structure of social inequalities that exists in the country. The lack of and/or limited access to the Internet among this particular group of people has its own implications and as such impacts heavily on individuals from these communities. Lack of cyber awareness, knowledge and skills hinder members of rural communities from enjoying the benefits offered by the Internet.

Theoretically, the less educated in rural communities are part of the information generation we live in now. However, since they lack the required exposure and awareness of the Internet, basic skill/knowledge on how to use the Internet, and majority of them only communicate in their native languages, they are greatly disadvantaged compared to their counterpart in developed countries and cannot enjoy the benefits offered by the Internet.

The problem of the cyber divide in South Africa especially among the rural communities is exacerbated by the factor of language. According to the 2011 census, isiZulu is the mother tongue of 22.7% of South Africa's populations, followed by isiXhosa at 16%, Afrikaans at 13.5%, English at 9.6%, Sepedi at 9.1%, Setswana at 8%, Sesotho at 7.6%, Xitsonga at 4.5%, Siswati at 2.5%, Tshivenda at 2.4%, isiNdebele at 2.1%, sign language at 0.5% and other languages at 1.6%. The above statistics show that many South Africans speak or use various native languages as their mother tongue. This demonstrates why the Constitution of South Africa clearly emphasizes that all the 11 official languages, taking into account the provisions of section 6 (1)(2), must enjoy parity of esteem and must be treated equally (Section 6 (1)(4) of Chapter 1). It further indicates that the State must take practical and positive measures to elevate the status and advance the use of the official languages (Section 6 (1)(2) of Chapter 1) (*Constitution of the Republic of South Africa, 1994*).

Yet over 70% of Internet content is in English and South Africa is not an exception. The implication of this is that people in South Africa who do not speak any English are at an enormous disadvantage as they would be left out from the various benefits offered by the Internet.

The research question considered in this work comprises the following:

- What countermeasures can be implemented to bridge the cyber divide in South Africa?

Having considered the digital and cyber divide as contained in the problem statement and the above research questions, the following two sections present the research method and the proposed framework for possible consideration for the achievement of the research purpose, namely decreasing the cyber divide in South Africa.

11 Methodology

This paper is based on a model-building approach that consists of two stages namely the framework stage and model stage. At the framework stage (this paper), this research reviews digital divide literatures from 2001 till date on issues such as existing efforts towards bridging the divide particularly in developing country, and factors of digital divide, and proposes a framework for bridging the cyber divide in South Africa. The model stage involves the implementation and testing of the framework.

12 The proposed framework

This section presents the proposed framework. The proposed framework in this research depicts the focus areas of this research. It also gives a picture of how the different areas of this research relate with one another towards the umbrella team of digital divide. Finally the framework portrays the educational intervention proposed as a possible countermeasure towards reducing the cyber divide in South Africa. The framework depicts the flow of different components of this research by means of a diagram. Highlighted in each step of the framework are the focus areas of this paper and the research project as a whole.

The framework consists of five steps that as depicted in Figure 1.

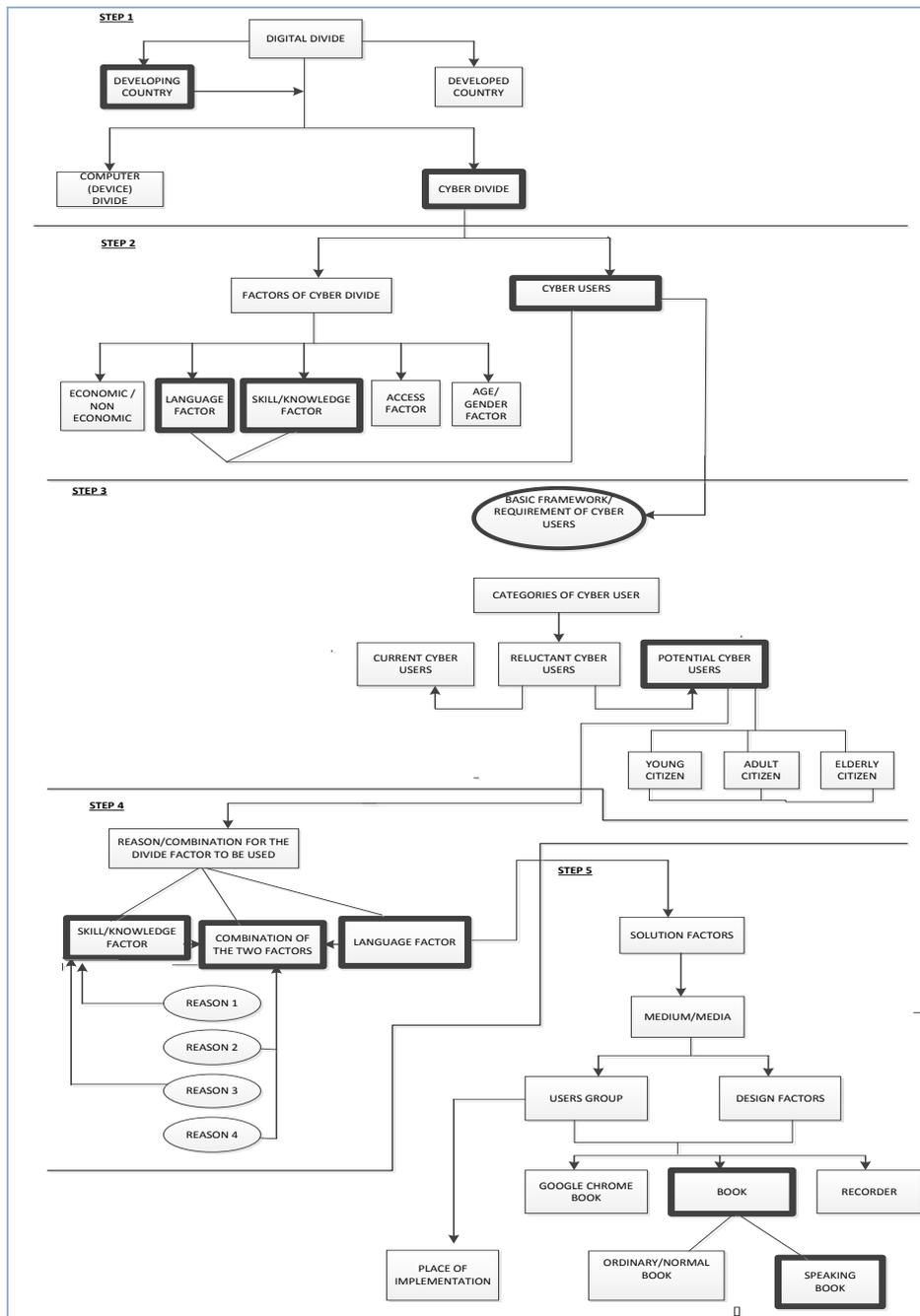


Figure 1: The proposed framework

It should however be noted that this framework proposes a new theoretical approach to address the cyber divide in developing countries. The framework will be tested and if successful can become the basis for new and improved frameworks. The five steps of the proposed framework will be explained from section 6.1 to 6.5.

Section 6.1 deals with the digital divide and the two subcomponents of the divide defined in this study, namely the computer divide and the cyber divide.

Section 6.2 focuses on cyber divide and the factors that cause the cyber divide.

Section 6.3 considers who a cyber user is; the basic requirements of a cyber user; and the categories of cyber users defined in this study.

Section 6.4 focuses on the solution factors proposed in the study as a countermeasure to assist towards bridging the cyber divide and the reasons for the particular solution factors.

Finally, section 6.5 presents theoretically possible approaches that can be used in applying the two cyber divide solution factors proposed in the framework. The particular approach this work proposes as a countermeasure will be implemented and evaluated in the next phase. Each of these steps will be investigated separately in detail in the coming sections.

Step 1: Digital divide and its aspects

This section explains the first step of the framework which demonstrates that the digital divide affects both developed and developing countries. However, for the purpose of this research, the focus is on developing country (highlighted in Figure 1) with particular reference to South Africa.

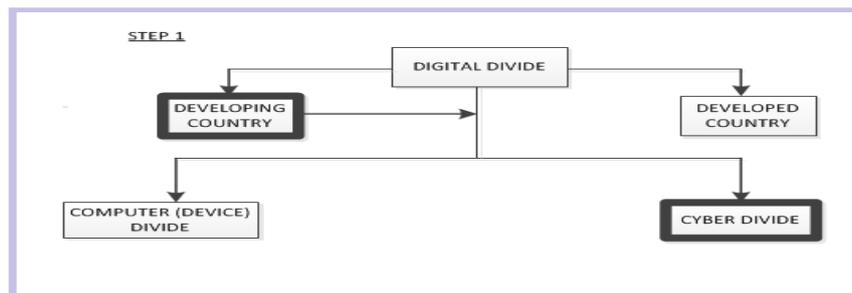


Figure 1: Aspects of the digital divide

The concept of a digital divide has two subcomponents:

- Computer/Devices divide – the divide between those who have and those who do not have access to computers and other technology equipment, and/or the skills to use ICTs. The term ‘computer divides’ is used interchangeably with device divide in this article.
- Cyber/Internet divide – the gap that exists between those who have and those who do not have access to the Internet and/or the skills to operate in the cyber community.

The digital divide is a super-type and the two subcomponents are its subtypes that are derived from the definition of the digital divide in some studies. This research takes cognisance of the fact that various literatures view the concept of digital divide differently hence their definition of the concept varies. Some literatures define the term digital divide to accommodate the divides that exist within the two digital subcomponents introduced above. This help to acknowledged that a divide can exist in either or in both subcomponents of the digital divide (Oecd, 2001; van Dijk, 2006; Warschauer, 2013). However the focus on this research is on decreasing the cyber aspect of the digital divide (highlighted in Figure 1 above). In this research, the term cyber divide is referred to as the divides that exist in a cyberspace. Cyber divide is an aspect of digital divide that affect people in the cyber community or people who which to operate in the cyberspace. Cyber is a subset within Digital. What this means according to this research is that cyber is not wholly equal to digital.

The concept of super-type and subtype used in depicting the relationship that exist between the digital divide and its subcomponents is derived from Coronel, Morris and Robs’ database principles book (Coronel, Morris, & Rob, 2012). Super-type contains common characteristics while each subtype may also contain its own unique characteristics. For this reason, the digital divide factors are also considered as cyber divide factors even though the cyber divide can further have its own different divides.

The next section 6.2 will expand more on the concept of cyber divide.

Step 2: Cyber divide

This section discusses step 2 of the proposed framework. The concept of cyber divide was first introduced in section 6.1 and figure 1 as an aspect of the digital divide. Since the aim of the study is to contribute towards bridging the cyber divide in South Africa, this section focuses on the ‘cyber divide’ by discussing the cyber divide factors that affect users in this environment (see Figure 2).

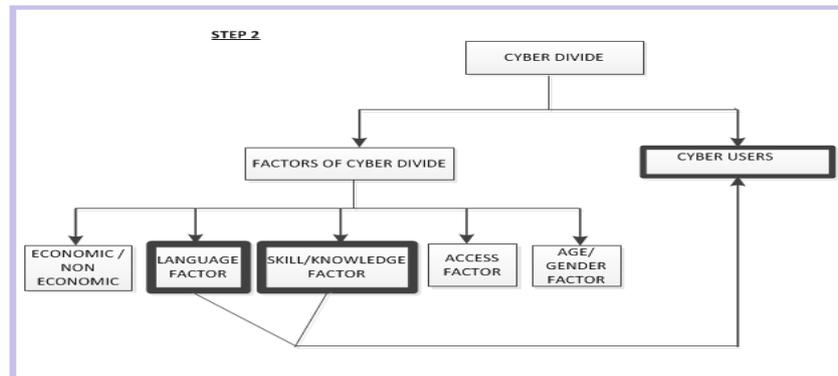


Figure 2: The Cyber Divide and its Divide Factors

As depicted in Figure 2, the factors that are identified within the cyber divide include:

- Economic factors (rich/poor nations, household income, and other economic conditions)
- Language factor (unable to speak or understand the language the Internet is made available)
- Skill/Knowledge factor (lack of cyber skills and knowledge of its benefits)
- Access factor (limited or no computers and network connections)
- Age and Gender factors (young/old and male/female)
- Non-Economic factors (other non-economic divide include: cultural, attitudinal and content divide)

However, for the purpose of this research, the focus areas are on language and Skill/Knowledge factors highlighted in Figure 2.

The Internet became widely available to the public in the 1990s in some ways to forge a link between multiple forms of ICT. Since then a lot of predictions have been made on how the use of cyber technology has increased and is expected to continue increasing (Castells, 2003; Kreutzer, 2009; Lewis, 2005; Longe et al., 2009). But despite all these predictions and projected increase, the use of Internet is still not universal, leaving developing country like Africa still remain among the three continents with low rates of Internet access and use (Haseloff 2005; Oyedemi, 2012). This research argues that this problem occurs partly due to the language background and lack cyber skills of the Internet users. According to the Internet World Statistics Report published in 2012, African Internet users represent only 7.0% of the world Internet users to compare with 44.8% and 21.5% of Europe (“World Internet Users Statistics Usage and World Population Stats,”). This indeed depicts that the cyber divide is a problem in developing country compared to the rest of the world.

Previous and current literature within and outside Africa have extensively discussed the various factors that affect the digital divide as: access divide, Skill/knowledge divide, cultural and attitudinal divide, language divide, gender divide, age and content divide (Cullen, 2001; Elzawi & Wade, 2012; Fuchs & Horak, 2008; Keniston & Kumar, 2003; Kouadio, 2008). All the cyber divide factors listed in Figure 2 are important towards bridging the cyber divide. However this research considered specifically language and skill divide since they have been a strong factor that correlates with the use the Internet and will undoubtedly continue to affect the use of the Internet (Khan, 2011; Warschauer, 2013). Since most people living in South African rural communities are not very literate and mainly communicate in their native languages this research deems it necessary to propose the use of language and skill in the framework as a countermeasure. This supports the view of Akinsola et al which suggests that in order to solve the problem of digital divide it is necessary to have an understanding of the underlying cause of the digital divide (Akinsola, Herselman, & Jacobs, 2005). Language divide has not received much attention in the past (Khan, 2011). Even though recent research are now drawing attention to the important of language divide as a prominent factor shaping the use of the Internet (Warschauer, 2013), more still need to be done particularly in developing country like South Africa. In this research, the language divide is not considered in isolation but in conjunction with skill/knowledge divide to be used to provide cyber based education. These two divides are highlight in Figure 2.

Providing people with cyber basic education equips them with resources which can help minimise many difficulties associated with their economic development.

The language divide is a complex and significant divide as it is related to access to content and broader issue of ICT (Warschauer, 2004). Various literatures acknowledge that cyber language has a great impact on the Internet usage. The language used by the Internet user to access the Internet is another important variable that could influence the usage of the Internet (Haseloff, 2005). In his work, Kouadio mentioned language literacy as a handicap of the Internet usage (Kouadio, 2008). Language is also regarded as a prominent factor that shapes access to the Internet (Warschauer, 2013) and same is applicable to South African communities.

Language, as a form of divide, should not be considered in isolation. It intersects with socio-economic issues such as education, and literacy which are directly linked to skill/knowledge of the Internet use. These factors dramatically affect how different groups operate on the web as well as the extent to which people make use of the Internet (Warschauer, 2004). These form part of the reasons for the possible solution factors proposed in the research. This section is followed by step 3 of the framework.

Step 3: Cyber users, requirements and categories

Section 6.3 investigates the step 3 of the framework. This section discusses who a cyber user is, the basic requirements of cyber users and the categories of cyber users (depicted in Figure 3).

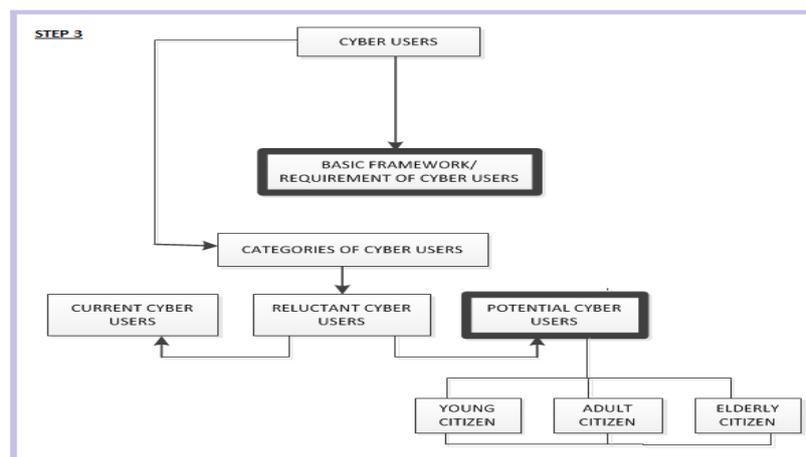


Figure 3: The requirement and categories of Cyber users

Figure 3 depicts cyber users and some basic requirements to be met to qualify as a cyber user. The figure also categorizes the cyber users into current and potential cyber user. However, this research focuses on potential cyber users which can be the young, the adult or the elderly citizens.

The Internet World Statistic (IWS) defines a cyber user as anyone who is currently capacitated to use the Internet. According to them, two requirements exist for a person to be considered a cyber user: (1) available access to the Internet and (2) the basic knowledge to use web technology. In this study therefore, a cyber user is referred to as a member of a globally-connected community who is currently capacitated to use the Internet (Internet word statistic)

This paper accepts and adopts the IWS definition of a cyber user but has a different view in terms of their two basic requirements for a person to be considered as a cyber user. The birth and increased availability of the 'WIFI' technology bring about the need to have access to ICT devices that can connect to the Internet. Nowadays, people do not necessarily have to pay for bandwidth to have access to the Internet since many WIFI technologies are available. The problem however is that some if not the majority of the available WIFI requires one to have computer devices. With this in mind this research therefore redefines the basic requirements for a person to be considered as cyber user. It includes not only connection

access, but also access to information and communication technology (ICT) device such as computer and smart phones. What Van Dijk and Hacker described as material access and Warshauer as physical resources (J. Van Dijk & Hacker, 2011; Warschauer, 2004).

In accordance to this research, the three basic requirements for a person to be considered a cyber user are: (1) One must have access to ICT device; (2) One must have available connection to the Internet; and (3) One must have the basic knowledge to use web technology. The study also defined the three various categories of cyber users to include current cyber users, potential cyber users and reluctant cyber users. Current cyber users are people who meet the three basic requirements of cyber users defined in this study. These are people that currently know and make use of the Internet. Potential cyber users according to this research are cyber users who currently do not make use of the Internet. The reluctant cyber users can fall in between the two. This research focuses on investigating potential cyber users (highlighted in figure 3) as a specific category of cyber users for purposes of this research.

The next step in the proposed framework is determining the possible solution factors to be applied as a countermeasure towards decreasing the cyber divide among potential cyber users.

Step 4: Determinate of a solution factor

This section 6.4 is step 4 in the proposed framework. In Figure 6.2, cyber divide factors was discussed, focusing on language and skill/knowledge as possible factors towards bridging the cyber divide among the potential cyber users. This section shows that the particular factor to be applied depends on reasons considered in Figure 4.

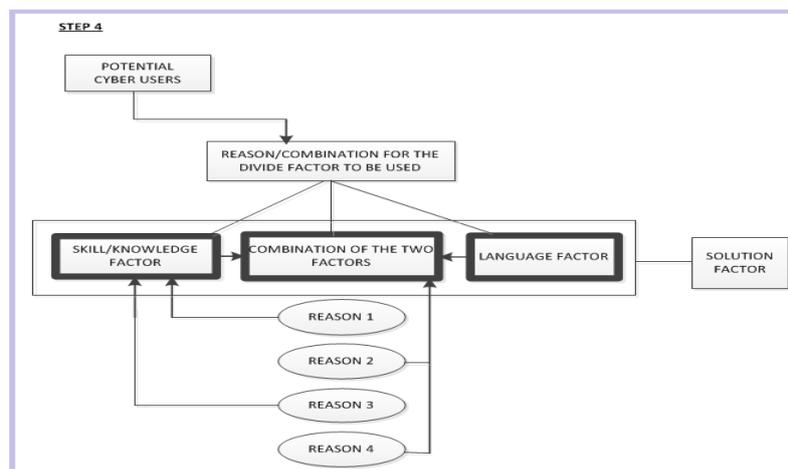


Figure 4: Determining the divide factor

The cyber divide factors proposed as a possible countermeasure for bridging the cyber divide are referred to as the solution factors Figure 4. To determine a solution factor or a combination of factors applicable to a particular cyber user depends on various reasons for being a potential cyber user. This section is essential for gathering the information needed for decision making on the particular solution factor or a combination of various solution factors to be applied. The solution factor to be applied depends on the reasons behind the divide. The following reasons as shown in Figure 4 are considered in this article:

Reason 1: Where a person lacks only the necessary awareness of the Internet and the benefits it can offer. In this instance, the knowledge solution factor is applied.

Reason 2: Where a person lacks language proficiency (English), the necessary awareness of the Internet and the benefits the Internet can offer. In this instance, the combination of language and skill solution factors is applied.

Reason 3: Where a person lacks only the necessary skill/knowledge on how to use the Internet. In this instance, the skill/knowledge solution factor is applied.

Reason 4: Where a person lacks both language proficiency and the necessary skill/knowledge on how to use the Internet. In this instance, a combination of language and skill solution factor is applied.

Depending on the reason(s) why a cyber user is a potential or reluctant user, either the skills/knowledge factor or the language factor or a combination of the two should be applied. Next section will consider the possible proposed model.

Step 5: Theoretical Implementation

This is the final step in the proposed framework. The solution factors proposed in the above framework (see Figure 4) for reducing the cyber divide in South African context need to be modelled, implemented and tested through various media platform. However, it should be noted that this paper is still only the proposal phase and not yet at the implementation, evaluation and testing phase. There are varieties of possible devices and media platforms that can be used as educational intervention towards bridging cyber divide. For the purpose of this paper only three media platforms are considered: Google Chrome book, Book (either ordinary studying books or speaking book, and Recorder (figure 5).

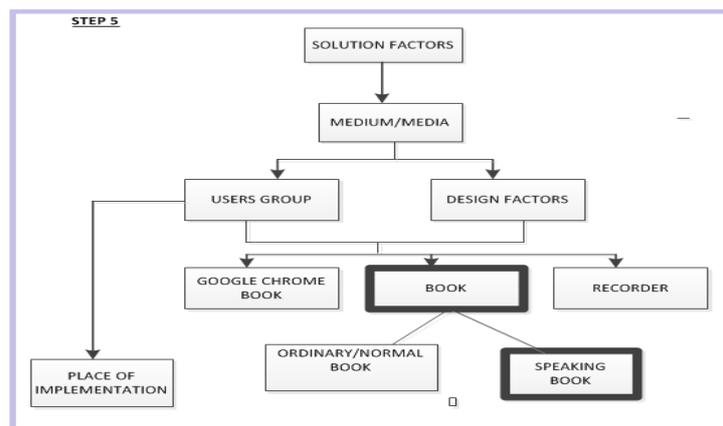


Figure 5: The proposed model

Each of the media platforms mentioned in Figure 4 has its own benefits and challenges. The platforms can also be used in different environments, targeting different groups of people depending on factors such as economic status, educational level, and age. Deciding on the possible educational intervention to be proposed, this research considered the intending group of cyber users (User Group) and other factors (Design Factors) that might affect this group. The possible factors that might affect the group are for example, the learning ability and capability, language proficiency, educational level, and the mental capacity of the user group.

Google Chrome Book is web-centric device, meaning that your chrome book is always connected to the Internet and all your web applications runs efficiently each time you login. With chrome book, one does not need to worry about security and backup (Rome, 2011). Google Chrome book is an advanced technology and as such would not be suitable for this research audience who probably are still beginners in the use of the Internet or people who never used the Internet before. Chrome Book is comparatively expensive and requires its users to have a compressive access to the Internet.

Recording device such as CD is also a possible educational device that could be used to teach people how to use the Internet in their own native languages. However it requires one to have the necessary technologies to operate the devices at any particular time. In comparison with Chrome book, CD is cheaper and does not require extensive Internet access.

Book particularly speaking Book is the educational device that this study is proposing to be used as a possible countermeasure toward bridge the cyber divide in South Africa. Speaking Book is an educational device that South Africa has adopted from a developed country (the United States) and so far it has been used effectively in the health sector to teach people how to manage and prevent diseases in their own native languages. Speaking Book is used to deliver relevant and important information in an interactive and educational way, thus equipping disadvantaged rural people with the knowledge that can save or improve their lives. The use of Speaking Book in this study would help provide people in their own native languages, basic Internet knowledge and information and prepare them – especially those in rural communities

with little or no knowledge/skill to use the Internet – to become familiar with the ‘information generation’ world as ICT usage slowly enters and evolves in their lives.

Speaking Book as the name appears, is a book that speaks. It is a hard-cover talking book with 16 pages of colourful illustrations supported by straightforward and easy-to-understand text. Most importantly, each page has a corresponding push button that triggers a sound track of the text. It is a book that actually talks to you. In this way, no matter what the level of reading comprehension, the information will be seen, read, heard and understood with powerful results in a language that one speaks, reads and understands.

The current research chose Speaking Book as the possible educational intervention for teaching cyber education for the following reasons:

- Easy to understand
- Accessible to many people
- Allows for better dissemination of information
- Cost per individual device is cheap
- Can be produced in indigenous languages

The advantages and disadvantages of the media platforms discussed above are summarised in Table 1.

Table and of the media

Above all, these chosen to would motivate previously not on the Internet. solution will be tested and second phase of project. The section answers questions.

Media platform	Advantages	Disadvantages
GoogleChrom Book	<ul style="list-style-type: none"> • Provides data security and backup. • Advanced technology with many features. • Educational device. 	<ul style="list-style-type: none"> • Expensive.(to buy and maintain) • Requires comprehensive access to internet. • Is too advanced for potential cyber users who have not used the internet technology before.
Recorder	<ul style="list-style-type: none"> • Educational device. • Cost-effective. • Does not require extensive internet access. • Accommodate other languages. 	<ul style="list-style-type: none"> • It requires access to other technologies at any particular time.
Speaking Book	<ul style="list-style-type: none"> • Interactive educational devices. • Assessable to many people. • Allows for better dissemination of information. • Easy to understand and does not require other technologies. • Cost per individual device is cheap. • Can be produced in indigenous languages. 	<ul style="list-style-type: none"> • Can be expensive if not buck purchased.

1: Advantages Disadvantages platforms

devices are determine if it people who are motivated to go This proposed implemented, evaluated in the this research concluding the research

13 Conclusion

It has been established in the problem statement that the cyber divide is still a problem in developing country like South Africa, particularly in the rural communities. Based on literature, this paper found that language divide is a problem particularly in African countries since there is little or no extensive effort in ensuring the use of native languages on a cyber space. Past efforts towards bridging the digital divide were mostly based on bridging access divide which is good but not sufficient. The language with which Internet is been thought and its contents are been made available to people is an important factor towards the use of the Internet.

Considering the importance of language as a strong factor that correlates with the use of the Internet, this work shifted emphasis to the two cyber divide factors (language, and skill/knowledge factors) as the possible countermeasure towards bridging the cyber divide in South Africa among potential cyber users.

The Internet has the potential to transform the lives of potential cyber users in the rural communities in Africa. Part of what is required is that efforts should also be directed towards providing basic awareness of the Internet benefits and

ensuring that people understand how to use the technology and its potential use. The potential cyber users should be thought the necessary knowledge on how to use the Internet in their own native languages hence this research focused its solution factors on language and skill/knowledge divide factors.

As a possible countermeasure towards bridging the cyber divide among potential cyber users in South Africa this research proposed a cyber education framework where the potential users are: (1) made aware of the importance and the benefits of the Internet; and (2) educated (through ICT devices available in their communities) on how to use the Internet in their own indigenous languages. In the same vein, creating the Internet content in African local languages would help in increasing its adoption by Africans, meaning that the Internet would not be seen as belonging only to foreign cultures and people.

The second phase (future work) of this research project will evaluate the proposed framework in selected rural communities through implementation. Upon implementation and evaluation of the framework, it can be improved by involving members of the rural communities.

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Privacy, legal and regulatory issues in the management of the internet of things for South Africa

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Abstract

The internet of things (IoT) is a concept which has its roots in sensing, networking and information processing approaches. It enables data exchange between devices, services and people. As a result of the integration of these technologies, big data is generated. Where there is big data involved, there arises challenges in privacy, legal and regulatory issues in the management and security of information within the sphere of IoT. There is no formal legislation yet in South Africa that is linked to IoT. However, there is a framework of pieces of legislation which govern information management and security within which the IoT should operate, for example, The Electronic Communications and Transactions Act and The Electronic Communications Act.

This research paper reports on such legislation, by extracting aspects that would apply to IoT, leading to the formulation of privacy, legal and regulatory issues of IoT for South Africa. Since IoT is an integration of big data, telecommunications, services and people, the identified aspects are those that relate to the information society, that is, the frequency spectrum, regulation of telecommunications, telecommunications policies, universal access, and interception of communications, rights of access to information, ethical issues and consumer protection.

The research came up with the following analyses: (i) that the information collected using IoT technologies should ensure that the privacy of the individual is observed. (ii) that government entities should be regulated within the sphere of IoT while undertaking their responsibilities, (iii) that the constitutional right of the individual to have access to data obtained and processed by the state, organisations and other individuals including the data that has been obtained or processed by the same via IoT is observed, (iv) that the IoT policies should also revolve around the regulation of the market and ethical issues of universal access, development of human resources in the sector and roping in small and medium enterprises (SMMEs) to provide services in the sector, (v) that legislation can be adapted to enable and facilitate electronic communications in the IoT by removing barriers through standardization of communications, combating cybercrime, protection of information through cryptography and monitoring information systems..

Keywords

internet of things; legal issues; regulatory issues; privacy issues

• Introduction

The internet of things (IoT) is a vision of a connected world in which people and physical and digital devices are connected and exchange data between themselves, as well as gather information from the environment and make appropriate decisions. The internet of things consists of five components, namely, (1) sensors to collect and transmit data, (2) actuators to trigger a device for a particular function, (3) computing node to process information collected by sensors, (4) receivers to receive messages from other devices or computing node and (5) communicators to pass messages from one component to another (Horrow, 2012). The IoT is built upon the ubiquitous connectivity of smart objects. Smart objects sense the environment around them and communicate with each other over the internet. With the massive deployment of sensors, actuators and everyday objects enhanced with communication and computing capabilities the IoT is closing the gap between the cyber and physical world by weaving technology into everyday life thus giving rise to privacy, legal, security and regulatory issues non-existent before. Weber (2010) argues that the ubiquity of the IoT requires new regulatory approaches to ensure privacy and security.

Rudolf van der Berg from the Expert Group on IoT of the European Commission concludes the following: (i) IoT locks spectrum use in the long run, (ii) There is room for standardisation in IoT, (iii) IoT is about information, (iv) Terms of data sharing in IoT should be defined, (v) Existing laws and regulations on IoT may be sufficient but it needs to be known that they exist and are adequate, (vi) Additional governance schemes of the IoT are required and (vii) The large majority of IoT applications will have a global dimension. This definition identifies the management of the frequency spectrum, regulation of the IoT industry, information management, governance, standardization of IoT, legal aspects of IoT and IoT policy as the requirements to be put in place.

The International Telecommunications Union's (2005) analysis of privacy in ubiquitous network societies emphasizes that three domains must be addressed in tandem when seeking privacy solutions: the sociological, technical and regulatory. Public education about what is desired and acceptable is a key part of the sociological solution. From a technological side, the development of privacy-enhancing technologies is emphasized. It is clear that the present standard of industry self-regulation is not sufficient to constrain the threat to privacy.

There is no formal legislation yet in South Africa that governs the IoT. However there are pieces of legislation in South Africa which govern information management and security within which IoT should operate. These are (i) The Constitution of the Republic of South Africa (Constitution of the Republic of South Africa, 1996), (ii) The Promotion of Access to Information Act No. 2 of 2000 (The Promotion of Access to Information Act, 2000), (iii) The National Credit Act (The National Credit Act, 2005), (iv) The Electronic Communications and Transactions Act No. 25 of 2002 (The Electronic Communications and Transactions Act, 2002), (v) The Regulation of Interception of Communication and (vi) Provision of Communication-related Information Act No. 70 of 2002 (RICA) (Regulation of Interception of Communications Act, 2002), (vii) The Protection of Personal Information Bill (Protection of Personal Information Bill, 2009), (viii) The Telecommunications Policy (White paper on Telecommunications Policy, 2014) (ix) The Independent Communications Authority of South Africa Act 2000 (Independent Communications Authority Act, 2000), (x) The Independent Broadcasting Authority Act 153 of 1993 (Independent Broadcasting Authority Act, 1993), (xi) The Broadcasting Act 4 of 1999 (Broadcasting Act, 1999), (xii) The Electronic Communications Act 2005 (Electronic Communications Act, 2005) and (xiii) The Sentech Act (Sentech Act, 1996). The Protection of Access to State Information Bill (Protection of Access to State Information Bill, 2010) has been submitted to the President of South Africa for enactment. The legislation spans the area of information security and privacy, telecommunications policies and regulations and legal issues. This document shall therefore report on privacy, legal and regulatory issues in the management of IoT for South Africa. It identifies a number of South African legislation that should be applied to IoT in South Africa.

• Problem Statement

Current legislature only provides protection for the broad definition of the internet but specifically does not cover for the IoT. Therefore this research asks the following questions

- a. What are the relevant aspects of IoT that need to be investigated from privacy, legal and regulatory points of view?
- b. Which current legislation is addressing these aspects and are they doing this in an adequate manner?
- c. Is the current legislation sufficient, does it need enhancement or is new legislation needed?

The research conducted a desktop study on South African legislation. Some of the information was collected from experts on regulatory issues. All this information was analysed to identify the link with IoT

- **Data Privacy in IOT**

The emergence of the IoT has created big data. The legal questions of big data include in particular the ownership of data, the limits of such data, the legality of their processing and the contracts needed between the suppliers and clients. A great deal of personal information, related to both one's health and identity might be inferred from one's aggregate data, for example, erroneous personal data from distributed databases could be linked to an individual. Data mining is prone to inaccuracies. Surveillance in public places highlights the blurring boundary between public and private space. Usually, individuals do not benefit from access to such information, highlighting an imbalance in power that emerges from the act of surveillance. Mining of data, invasive target advertising, loss of autonomy through marketing profiles tip the balance between consumer benefit and corporate gain. Protecting the privacy of individuals is also difficult in the internet age. The internet makes it possible to store and transfer large amounts of data at little cost and at the same time, vast amounts of personal information are searchable, linkable and traceable.

In the IoT domain, the collection of data and profiling are can be interpreted as an intrusion of privacy. The intention of data collection might be positive, as it enables governments and companies to provide services and better target citizens. However an excessive use of these technologies leads to practices for commercial or other purposes. Like other technologies that collect personal data, the focus should be on ensuring only data related to achieving the stated business objectives is collected. Moreover data collectors should make certain collected data is protected with the same rigorous privacy standards applied to personal data collected from other sources.

Information may be owned or free. It belongs to someone if it is protected by intellectual property. It may also be given in the form of a free licence. Therefore with the IoT we cannot dispense these old theories of ownership. Most countries have adopted regulations on the internet that limit liability of internet actors such as infrastructures, ISPs or hosting providers. These limited liabilities cannot work with IoT since the actors will have to account for technical performance of the IoT.

The 1980 OECD fair information principles (FIPPS) on privacy address the following (Massit-Follea, 2009)

- Consumers should be given notice of an entity's information practices before any personal information is collected from them
- Consumer choice means giving consumers choice to decide on how any personal information about them is used
- An individual must be able to access data about him/herself
- Data must be accurate and secure
- Principles of privacy protection can only be effective if there is a mechanism to enforce them
- The European principles of "proportionality and transparency" should be applied to IoT. "Proportionality" requires a balanced analysis of assessing risk and mitigating risk based upon threat to privacy. "Transparency" ensures IoT is not used to secretly collect data.
- In order to achieve transparency, individuals should receive reasonable and appropriate notification of the type of data collected and how the data will be shared and used.

The IoT generates a range of data such as health parameters, location data, lifestyle, etc. Pachube proposed an 'Internet of Things Bill of Right', i.e. a set of rights that it hopes to become an industry standard. It is intended to give people access to and control over their data created and gathered via IoT devices. In South Africa on the other hand the information security and privacy legislation include The Protection of Personal Information Bill (POPI), Regulation of Interception of Communications and Provision of Communication-related Information Act (RICA), Promotion of Access to Information Act (PAIA) and the National Credit Act (NCA).

3.1. Protection of Personal Information Bill

The Protection of Personal Information Bill (Protection of Personal Information Bill, 2009) aims to give effect to the right to privacy, by introducing measures to ensure that the personal information of an individual (data subject) is safeguarded when it is processed by responsible parties. It is about the protection of information processed by both public and private bodies with a view to privacy of information in the collection, retention, dissemination and use. Personal information must be processed lawfully in a manner that does not infringe on the privacy of the data subject. The information must be collected directly from the data subject unless the data subject has given consent for the information to be collected from other sources. The subject should be aware of the purpose of collection. The records must not be retained longer than necessary for achieving the purpose. A responsible party must ensure the integrity of the information in their possession. The data subject may request the responsible party to delete or correct the information. A person's personal information can only be processed by medical professionals, insurance companies, schools and child protection services for child/learner support, and employers on behalf of pension funds. Information cannot be transferred to foreign bodies unless the recipient is subject to a law or the subject consents to the transfer. This means that information collected via IoT technologies should ensure privacy of the individual.

3.2. RICA

Regulation of Interception of Communications and Provision of Communication-related Information Act (RICA) (Regulation of Interception of Communications Act, 2002) does not regulate the telecommunications infrastructure in the manner of the Telecommunications Act. Rather, it sets out the circumstances under which government entities or other persons may or must intercept or monitor communications. No person may intercept a communication in the course of its transmission unless they are authorised to execute interception. Any person may intercept a communication if they are party to the communication, or if one of the parties to the communication has given consent. Any person may in the course of carrying on any business, intercept any indirect communication. Any law enforcement officer may intercept communication to prevent serious bodily harm. Communication can be intercepted for the purposes of determining location in case of an emergency. Any person who is lawfully engaged in duties relating to the monitoring of signal for the purposes of installation or maintenance of equipment, facilities or devices may monitor the related signal for purposes of these duties. An employee may monitor signals and radio frequency spectrum for purposes of managing the radio frequency spectrum. No telecommunication service provider or employee may provide communication-related information to any person other than the customer of the telecommunication service provider, except when authorised by the customer. This legislation simply means that government entities should be regulated. This means that the government entities should be regulated as well within the sphere of IoT while undertaking their responsibilities to ensure safety and security.

3.3. Promotion of Access to Information Act 2000

The Constitution provides that everyone has the right to access any information held by the state. The Promotion of Access to Information Act 2000 (PAIA) (The Promotion of Access to Information Act, 2000) gives effect to the constitutional right of access to any information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights. A requester must be given access to a record of a public body if that requests complies with all the procedural requirements in this Act relating to a request for access to that record and access to that record is not refused in terms of any ground for refusal contemplated. This Act does not apply to a record of the cabinet and its committees, the judicial functions of a court, special tribunal or a judicial officer.

The grounds for refusal of access to records are:

- Protection of privacy of a third party who is a natural person
- Protection of records or certain records of the South African Revenue Service
- Protection of commercial information of a third party such as trade secrets of a third party, financial, commercial, scientific or technical information of a third party, or information provided in confidence by a third party
- Protection of confidential information of a third party

- Protection of safety of individuals and protection of property
- Commercial information of private body
- Protection of research information of third party and research information of private body
- Protection of police dockets in bail proceedings and protection of law enforcement and legal proceedings
- Protection of information whose disclosure will prejudice the defence and security of the republic
- Economic interests and financial welfare of the republic
- Protection of information on the operations of public bodies, disclosure of which is likely to frustrate processes in the public body or policy formulation processes

This means that the constitutional right of the individual to have access to data obtained via IoT should be observed as long as access to the data does not infringe on the rights and privacy of others and does not prejudice safety and security of the state.

3.4. National Credit Act

The National Credit Act (NCA) (national Credit Act, 2005) is designed to protect consumers in the credit market and make credit and banking services more accessible. With relation to information this Act is meant to achieve the following:

- To improve the standards of consumer information
- To prohibit unfair credit and credit marketing practices
- To regulate credit information.

The NCA does all this by simplifying and standardising credit agreements and information disclosure, regulating credit bureaux in terms of consumer information and records. On the issue of confidentiality, personal information and credit records, this Act advocates for the following:

- Right to confidential treatment
- National register of credit agreements
- Credit bureau information
- Removal of record of debt adjustment or judgement
- Right to access and challenge credit records
- Verification, review and removal of consumer credit information

The Act requires all credit bureaux to be registered and ensure data is accurate at all costs and that inaccurate information is immediately removed without cost to the customer. The NCA regulations stipulate how credit bureau information is obtained, used and for how long it should remain on a consumer's profile. Consumers are eligible for one free credit report

from each credit bureau each year in order to effectively manage their credit profiles. These same regulations should apply to data obtained and processed via IoT technologies.

3.5. Protection of Access to State Information Bill

Although the bill has not been enacted yet, it states that for security reasons classified information should not get out to the public. There have been arguments that public rights of access to information will be violated. There have also been arguments that it will promote corruption since individuals will conceal information under this bill. The Constitution of the Republic of South Africa states that everyone has the right of access to any information held by the State, and any information that is held by another person for the protection and exercise of any rights. Freedom of expression is also enshrined in the constitution. However, according to this bill classified information cannot be expressed in public. The IoT is affected in that people's access to information will be curtailed.

• **Regulatory and Legal issues of IOT**

The internet of things is defined as: "... a network that enables to identify digital entities and physical objects, directly and without ambiguity, via standardised and unified electronic identification systems and wireless mobile devices, and thus makes it possible to retrieve, store, transfer and process data relating to them, without discontinuity between the physical and virtual worlds" Mossit-Follea, 2009).

The advantage of the above definition is to contain most of the keywords symbolising the legal issues surrounding IoT (Barby, 2012):

- "network of networks" implies topics such as ownership and standards
- "identification system" implies topics such as traceability and monitoring
- "physical objects" implies topics such as quality and related matters
- "data" implies topics such as quality and ownership
- "processing of data" implies topics such as relevance and liability

The European commission has passed legislation that IoT devices are expected to be in the radio-frequency group (i.e. 100kHz) and operate with very low power, unlikely to produce significant levels of exposure to electromagnetic frequencies (EMF).

The principles underlying the internet of things require that each object is uniquely identified and identifiable inside the network. Currently there are three types of identifiers: a machine identifier (e.g. MAC address), a product identifier (e.g. bar code) and a digital identifier (e.g. IP address). With IoT identity is a key issue. There are two options; changeover from IPv4 to IPv6 or to come up with a new solution. The issue with the second option is the ownership of the future new addressing system and who will run the new system.

The main reasons advanced for regulation of telecommunications are:

- To maintain control over the use of valuable natural resource, namely the radio frequency spectrum
- To control anti-competitive behaviour by dominant players in the market, this in turn will lead to the realisation of universal access and to increases in quality and choice
- To ensure the development and implementation of effective universal services policies

Due to the ease of which data is collected, shared, analysed and stored leads to a proliferation of databases. Individual access to remedy incorrect data is a challenge. Computer, network infrastructure or process failures can lead to a paralysis of the overall automated IoT vision. To make this failure even more severe is the excessive reliance on technological infrastructure that is characteristic of this envisaged environment. Failure of smart devices, loss of functionality due to IT infrastructure, cyber-attacks, devices' weak access control will lead to overall systems failure. With the systems integrated the failure will have a far-ranging impact.

From an international perspective, as shown in the first part of this section, issues of universal access policies, control and regulation of the market, legislation of the radio frequency spectrum, data quality and ownership, regulation and monitoring of infrastructure, security of the infrastructure and standardization are identified. In South Africa, the legislations that would cover these identified issues include The Independent Communications Authority of South Africa (ICASA) Act, The Telecommunications Act, The Telecommunications Policy, The Electronic Communications and Transactions Act, The Electronic Communications Act and the Sentech Act.

4.1. ICASA Act

The Independent Communications Authority of South Africa (ICASA) (Independent Communications Authority of South Africa, 2000) is an independent regulatory body of the South African government, established in 2000 by the ICASA Act to regulate both the telecommunications and broadcasting sectors in the public interest. Traditionally, telecommunications and broadcasting services operated separately and so has the regulation of the sectors. Broadcasting in South Africa was regulated by the Independent Broadcasting Authority (IBA), whereas telecommunications was regulated by the South African Telecommunications Regulatory Authority (SATRA). Rapid technological developments have led to the convergence of broadcasting and telecommunications services. This also had an influence on the convergence of regulation resulting in the merging of the IBA and SATRA. ICASA functions under the Department of Communications (DoC).

ICASA is empowered by the Telecommunications Act to make regulations on telecommunications service licences, fees for these licences, the way in which telecommunication service licencees keep accounts and records. ICASA also prepares a frequency band plan. Telecommunication systems all require a certain amount of electromagnetic bandwidth to operate. In different parts of the world, different organizations allot parts of the overall electromagnetic spectrum to different uses. In many parts of the world, international agreements are required so that communications systems in neighbouring countries are not interfering with each other. So, the spectrum, that is, the full frequency range, is allotted to various purposes: analog TV broadcasts get a certain slot (from 54 to 88 MHz, 174 to 216 MHz and 470 to 806 MHz), FM radio gets a certain slot (88 to 108 MHz), AM radio gets a certain slot (535 to 1700 kHz), cellular communications (mobile phones) get certain slots. There are lots of these as little gaps in the spectrum have been given over to cell phone use. As the world becomes increasingly wireless (with cordless phones, cell phones, wireless internet, GPS devices, etc), allocation of the available spectrum to each technology becomes increasingly contentious. Each user community (usually manufacturers of the wireless equipment) wants more bandwidth in order to be able to sell and service more units. For any given slot of bandwidth, there is a limited amount of data that can be shared in that bandwidth, so vendors want more bandwidth so they can handle more devices in a given area.

Under ICASA socio-economic regulations, the licencing conditions for different sectors and areas differ. So do the licence fees. For example licences for disadvantaged dividend areas, that is, those areas without the penetration of digital communications, are subsidised.

Spectrum is a scarce commodity. Telkom and the military have monopoly over the South African spectrum. Not all spectrum is utilised and hence there is a lot of spectrum which can be allocated to other operators to render new services. Licencing of operations does not automatically mean that an entity qualifies for spectrum. The role of ICASA is to allocate frequencies to these spectrums. Wi-Fi, microwave, GSM all comes in different frequencies.

Under ICASA ethical issues, each ICASA area determines frequencies that work without interference from other areas. For example, amplification of signals results in signal amplitude increasing and interfering with other frequencies. Therefore it is necessary to put more base stations within a given radius in order to cover more areas as hand over occurs. For interoperability between systems technologies, interfaces should be standardised, e.g., user radio to send to fibre-optic or a physical network, free and open source framework for open standard applications.

Under ICASA regulatory issues, security of a network can be built into any layer of the ISO Reference Model. If it is built into the application layer, it can easily be hacked into. At the physical layer security uses IP addresses. Security at this

layer can be enhanced through physical-edged addresses that cannot be broken into. The physical layer 1 and the network layer 2 provide more security in a network.

The architecture of the technology affects regulatory issues. In a GSM network you have a base switch, a base station controller and the base station itself. At the base station controller level is attenuation. The switch gets a number, puts you to a route, e.g. 00 for international calls, and then puts you to the next switch, etc. The architecture is built around logic. Broadband cannot be transmitted through a switch though. Attenuation is caused by resistance to the signal strength. For broadband networks the cells are smaller, hence there are no attenuation loops. The LTE base station operates a broad pie and a radius of 500 metres to 1 kilometre, so you can get signal strength. The regulations on fibre, wireless will be different.

Frequencies can be categorised into ultra-low, medium, low, high and very high frequency. LTE and TV spaces have a low frequency of between 700 and 900MHz. Low frequencies can penetrate walls. High frequency cannot go through walls. High frequency resonates with the wall and creates interference. The capacity for propagation or transmission of signals is determined by the material used. Therefore to understand the properties of these frequencies one needs to understand these materials. Low frequency materials are in high demand. Laser is high frequency hence it resonates.

2.4 GHz and 5 GHz are bands which are not regulated. 2.4 GHz is used for testing technology more than to put up a service. Systems are then migrated to regulated frequencies. Direct point-to-point optical technologies are not regulated. They are good in short distance communications and high capacity carriers. Intra-township can use these point-to-point optical technologies while out-of-township can use microwave or fibre-optic technologies. Fibre is light and hence there is no interference. On the other hand microwave has interference and a line of sight is required to avoid a reduction in strength.

4.2. Telecommunications Act

The Telecommunications Act (Telecommunications Act, 1996) does 3 things: (1) it sets out fundamental rules for the telecommunications industry, e.g. that one may not provide a telecommunications service without a licence, that no one may transmit a signal by radio or receive a signal by radio without a licence, (2) it initially established the telecommunications regulator called SATRA which was later merged into ICASA through the ICASA Act, (3) ICASA must establish other rules for the telecommunications industry.

The Telecommunications Act covers for radio regulations and telecommunication regulations including mobile cellular communications. Radio dealers are expected to keep records of all radio apparatus sold, hired, supplied and the apparatus should be tuned to the right frequency that the licensee is allowed to use. Sections 95 and 96 of the Telecommunications Act empower the regulator, ICASA, to make regulations which must be approved and published by the Minister of Communications. The Telecommunications Act also empowers ICASA to issue licences and makes orders in relation to disputes.

This Act regulates telecommunications infrastructure, and regulates the market and controls unfair practices. The same should be adapted to IoT.

4.3. Telecommunications Policy

The Telecommunications Policy (Weber, 2010) deals with the universal service, market structure and independent regulator. The White paper on Telecommunications Policy set out that there should be an initial period of exclusivity for Telkom. The Telecommunications Policy should accommodate new services and technologies, e.g., international call-back services and internet telephony services. At the beginning of the exclusivity period additional market segments would be open up for competition, that is, local loops, public payphones and national long distance and metropolitan area networks. The policy provided for a second national operator to compete with Telkom and the amendment of the Sentech Act to provide international communication gateway services and multimedia services. SMMEs would be licenced to provide services in under-serviced areas. The policy required the Minister of Communications to develop an ICT strategy to be reviewed every 2 years and a national e-strategy to be reviewed every year. The national strategy is to deal with universal access, development of human resources and facilitating use of electronic communications by SMMEs. One of S.A.'s international obligations is in terms of GATS. GATS provides that any signatory country should treat service providers from other countries as favourably as it treats service providers from its country.

The policy is on the regulation of the market and ethical issues of universal access, development of human resources in the telecommunications sector and roping in SMMEs to provide services in the sector. These policies can also be adopted in South Africa's IoT sector.

4.4. Electronic Communications and Transactions Act 2002

The objective of Electronic Communications and Transactions Act (Electronic Communications and Transaction Act, 2002) is to enable and facilitate electronic communications and transactions in the public interest. It does not regulate telecommunication infrastructure in the manner of the Telecommunications Act. Rather, it removes the legal uncertainties regarding electronic communications and transactions and facilitates the use of telecommunications. It serves the following:

- Development of a national e-strategy
- Remove barriers to electronic communications
- Encourage the use of e-government services
- Observe international standards
- Encourage investment in the telecommunications sector
- Promote SMMEs to transact electronically
- Promote HR development in skills relevant to the telecommunications sector
- Ensure efficient use and management of the .za domain
- Keeping a directory of cryptography providers
- Protection of personal information collected via telecommunications
- Protection of critical databases
- Appointment of cyber inspectors to monitor information systems
- Combat cyber crime

The Electronic Communications and Transactions Act can be adapted to enable and facilitate electronic communications in the IoT by removing barriers through standardization of communications, involving SMMEs in the industry, combating cybercrime, protection of information through cryptography and monitoring information systems.

4.5. Electronic Communications Act

The objectives of the Electronic Communications (EC) Act (Electronic Communications Act, 2005) are:

- To promote convergence in the broadcasting, broadcasting signal distribution and telecommunications sectors and to provide a legal framework for convergence of these sectors
- To make new provision for the regulation of electronic communications services, electronic communications network services and broadcasting services
- To provide for the granting of new licences and new social obligations

- To provide for the control of the radio frequency spectrum
- To provide for the continued existence of the Universal Service Agency and the Universal Service Fund

This Act can be adapted in IoT for the regulation of electronic communication services, control of the radio frequency spectrum and universal access.

4.6. SENTECH Act

The main objective and business of Sentech (SENTECH Act, 1996) is to provide as a common carrier, broadcasting signal distribution for broadcasting licensees in accordance with the provisions of the Independent Broadcasting Authority Act. The state is the only shareholder of the company. This Act can be adapted for a common OpenIoT platform, that is, standardization

• Conclusion

This document presents a framework within which IoT should operate in South Africa. This framework consists of S.A. legislations that relate to data privacy, legal and regulatory issues. Legal IoT issues from an international perspective are also reviewed at the end of the document.

This document reports on such legislation, by extracting aspects of these legislations that would apply to IoT. These aspects lead to the formulation of privacy, legal and regulatory issues of IoT for South Africa. Since IoT is an integration of big data, telecommunications, services and people, the identified aspects are those relate to the frequency spectrum, regulation of telecommunications, telecommunications policies, universal access, and interception of communications, rights of access to information, ethical issues and consumer protection. The information collected using IoT technologies should ensure that the privacy of the individual is observed. Government entities should be regulated within the sphere of IoT while undertaking their responsibilities. As has traditionally been the constitutional right of the individual to have access to data obtained and processed by the state, organisations and other individuals, so does the data that has been obtained or processed by the same via IoT be made available to protect the rights of the individuals. Even for data collected via IoT technologies the national Credit Act regulations stipulate how credit information is obtained, used and for how long it should remain on the consumer's profile. The IoT policies should also revolve around the regulation of the market and ethical issues of universal access, development of human resources in the sector and roping in SMMEs to provide services in the sector. The Electronic Communications and Transactions Act can be adapted to enable and facilitate electronic communications in the IoT by removing barriers through standardization of communications, involving SMMEs in the industry, combating cybercrime, protection of information through cryptography and monitoring information systems. The Sentech Act can be adapted for a common OpenIoT platform, that is, standardization.

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Cyber-Based Obscenity and the Sexual Exploitation of Children via the Internet: Implications for Africa

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Abstract

Volumes of empirical studies indicate a continuing rise in the sexual exploitation of children as unscrupulous predators persist in using cyberspace and hi-tech mobile phones in targeting children either as subjects or objects of cyber-based pornography. Among the nefarious activities in this area are the production, distribution and use of materials depicting child sexual abuse; online solicitation of children; exposure to materials that can cause psychological or physical harm or aid other detriment to a child as well as cyber-based harassment and intimidation – all having grave implications for the development of affected children. Despite the steady legal and policy responses initiated by various governments and intergovernmental institutions around the world to tackle this twin menace, this paper highlights the inertia of the vast majority of African States towards this problem. Reflecting on the promise of the broad assemblage of normative and policy frameworks already adopted and being implemented elsewhere, this paper canvasses broad-based, multi-pronged approaches to curbing the sexual exploitation of children over the Internet in Africa by identifying a network of duty bearers – governments; non-State actors, including multinational information technology business entities; parents, families and children themselves – through which synergised responses could be built for the common good.

Keywords

Children, Sexual Exploitation, ICT, Development, Africa.

15 Introduction

It is safe to posit that globalisation has wrought mixed fortunes on and across many nations. There have been winners and losers in the reforms and developments over the last decade. Children and minors, and invariably, their rights, have not been left out of these dynamic developments. The Internet is not governed by anyone and it does not respect any global boundaries. This makes it difficult to fully monitor. Several countries have recognised new forms of child sexual exploitation and have begun to dedicate the necessary resources and attention to this growing problem. Unfortunately, Africa is underrepresented among those countries and has largely been slow to react with the proper resources and tools for law enforcement (ICMEC, 2006; Olowu, 2009).

The protection of children has always been a priority for Africans as well, going by the litany of treaties and mechanisms established for the protection of their rights (examples are the African Charter on the Rights and Welfare of the Child, 1990, and the African Committee of Experts on the Rights and Welfare of the African Child). As more and more Africans recognise the value of the Internet and get online in their homes, the risks to their children increases as online predators go searching for new victims. The African region has been slow to respond to this new problem but there is an acknowledgement, both inside and outside governments that Africa needs coordinated law enforcement strategies to deal with the cybercrime problem (Olowu, 2009).

While this paper acknowledges the legal and policy approaches to tackling the menace of the sexual exploitation of children via the internet, a strong case is made for reconceptualising the child sexual exploitation on the Internet as a development question. The underpinning premises of the approach canvassed in this paper are as follows: (a) that the protection of children involves much more than keeping them safe; our objective should always be to promote their well-being and development; (b) that the protection of child well-being and development requires that interventions fit children's social and economic context and involve their families and communities; (c) that in interventions for children, the interests of children must explicitly be a primary consideration; (d) that all protective policies, programmes, and activities for children should be accountable according to their observed outcomes in affected children's well-being and development; and (e) that to ensure that protective policies and programmes are beneficial to children, it is necessary to consult them and to take their opinions seriously.

16 The Development Angle

What has the protection of children from cyber-obscenity and sexual exploitation got to do with development? Four critical arguments underpin the overarching premise of this paper in placing the problem of cyber-based exploitation of children squarely in the core of development discourse. First, development requires attending to children, who in developing countries may comprise half the population or more. Their presence and status can therefore not be ignored since they have needs specific to their young ages. Second, these children will control the future of Africa, perhaps even sooner than expected (as recent events in the Arab world and elsewhere might suggest), and long-term development policy must therefore address their protection and preparation to assume responsibility for society not many years from now. Third, as human development assumes increasing prominence in development thinking, how to protect and raise children becomes a central concern that strongly influences the parameters of possibilities. Finally, the protection of children cannot be understood without considering how children are affected by development policy more broadly. The directions in which both world events and development concerns are moving suggest that international ideas, policies, and actions for the protection of children need to be seriously reconsidered holistically. This contribution is intended to provoke and inform that rethinking.

It has long been understood that the greatest threats to children in poor countries come from generalised conditions of poverty and violence that affect society as a whole, and that their well-being ultimately depends on economic and social development reducing these threats to everyone (Myers and Bourdillon, 2012a).

The consequences of cyber-based violence, abuse and exploitation of children can be devastating and can indeed result in early death. But even children who survive must cope with terrible physical and emotional scars (Lebloch and King, 2006). Indeed, violence places at risk not only their health, but also their ability to learn and grow into adults who can create sound families and communities. In the context of this paper, the ownership of the accountability processes in the battle against the online sexual exploitation of children must integrate children themselves as well as their families and communities. The successful results from previous developmental projects involving children within communities justify the approach canvassed in this paper (see Crivello *et al.* 2011). Re-classifying online child sexual exploitation as a development issue, therefore, will promote the emergence of a model of identification, risk assessment and intervention as a working tool for practitioners.

Consequently, in considering the development of children, we must view them holistically and in their social context, because biologically-oriented theories of child growth and development commonly used for health and education purposes, may have too limited a view of children's makeup and of their interactions with their social context (Myers and Bourdillon, 2012b). A more pragmatic approach will take into account children's strengths and initiatives as well as their weaknesses and vulnerabilities, an important perspective for thinking about risk, resilience, and protection as transactions between children and others in their environment. Young people are therefore not to be viewed simply as 'victims' in the ICT world. Many new ICT technologies are being developed by adolescents and youth, and young people are themselves transforming the ways in which ICT is defining the socio-economic and political facets of human connectivity. The massive 'Arab Springs' protests in the Middle East lends credence to this assertion (Cook *et al.* 2012). Viewed in this context, every form of violence against children thus constitutes a major threat to global development and the massive efforts at reaching the Millennium Development Goals (MDGs). The world will not achieve universal primary education unless children are safe in school. The spread of HIV/AIDS will not be halted until we also stop all kinds of violence against girls that help to fuel the pandemic. Violence against children is also a major obstacle to gender equality. These are the veritable vectors of intersection between cyber-based sexual exploitation of children and the development discourse.

17 Enormity of the Problem

By current estimates, there are some three billion Internet users across the world (Internet Live Stats, 2014). The overwhelming majority of people use the net for work, research, or to communicate with family and friends. Yet, there is a portion of society that uses the Internet for reprehensible purposes, including the exploitation of children and minors.

Among several other potential risks, the sexual exploitation and abuse of children and youth over the Internet is of substantial concern. Children and youth can be abused over the Internet in many ways and these Internet-related sexual exploitation activities directly or indirectly result in offline situations of sexual abuse directed against children (McGuire and Dowling, 2013: 4-6). The need exists to identify the most vulnerable population of children and youth who are at risk of online sexual exploitation over the Internet, and to determine whether prevention and intervention programmes for online sexual exploitation have been evaluated.

Compounding the identified challenges is the reality of criminal enterprises benefitting from the relative obscurity the internet provides. Law enforcement agencies struggle to locate offenders because of the ability to conceal online identities and shield unlawful activities through security programming. This obscurity is compounded by a strategic use of internet service providers (ISPs) across multiple jurisdictions. When a perpetrator suspects that law enforcement in one jurisdiction is tracking his/her activity, he/she needs only to relocate the criminal enterprise to an ISP beyond the reach of the pursuing authorities. As a result, swift action is required to attribute cyber-exploitation of children to users before they can transfer to the relative safety of a different ISP. Cybercriminals also frustrate law enforcement by developing new means to further their misconduct. Commercial websites once served as the major source of online exploitative images of children, where individuals paid a fee to access site content. These groups are now moving toward smaller social networks, image-sharing sites, free-hosting platforms, and hacked websites (Petty, 2011).

The African region is one of the most rapidly growing populations of ICT users in the world, most of whom are young people. In the period between 2000 and 2012, the region witnessed astounding ICT user growth, with the rate rising from 4.5 million in 2000 to 167 million people in 2012 (Miniwatts Marketing Group, 2013). As a youthful continent, this has important implications for the ways children and youth will shape the future of Africa's socio-economic and political systems. The challenge of devising effective protection services is especially critical where new kinds of problems for children and youth arise as a result of evolving ICT. Yet, it is not easy to determine the actual Internet penetration in Sub-Saharan Africa. Internet subscriptions do not accurately reflect Internet use in the region because, generally, an Internet subscription (fixed or mobile) may be shared by several people while numerous Africans only have access to the Internet through their jobs or at schools. Furthermore, the primary sources of Internet connectivity in many African countries are cybercafés. In some countries, community multimedia centres are created mainly in rural areas to facilitate Internet access for rural populations. In the face of this difficulty, the number of Internet users per hundred inhabitants is used according to the definition and usage by the International Telecommunication Union (ITU), and, in the absence of reliable statistics from African governments, the only sources of credible data are from the ITU database, the Miniwatts Marketing Group statistics as well as the Internet Live Stats as monitored in real time (see Miniwatts Marketing Group, 2013; ITU 2013; Internet Live Stats, 2014).

All children who use ICTs are at risk. Moreover, children who do not have access to the latest ICTs may also be at risk without their awareness. They may, for instance, become the subjects of photos or videos that are then sent into cyberspace; they may be advertised online as commodities; and/or are affected by violence and harm arising from other people's online interactions, including the sharing of pornography. The sexual exploitation of children takes place in both developing and developed countries, but there is no reliable means of determining the number children who have been victimised. Data collection is often *ad hoc* or limited in scope and targeted research is scarce. Also, due to its illegal nature, the sexual exploitation of children is largely concealed, which makes estimates of its true scope difficult to assess. In some regions where this is a taboo subject, such as Central Asia, the Middle East and much of Africa, evidence is primarily anecdotal (ECPAT International, 2009). Until very recently, there has been no serious attempt to address the issue in these areas and very little research has been conducted. Even in regions where research has been conducted, data is generally not disaggregated adequately enough to present a true picture. How the rest of the world is responding to these challenges portends tremendous implications for Africa.

18 Responses to the Menace

Until very recently, the attention of the international community to the phenomenon of the sexual exploitation of children had been limited to the exploitation of children under 18 years old through prostitution, child pornography and similar activities and had led to the adoption of the Declaration and Agenda for Action, at the World Congress against Commercial Sexual Exploitation of Children, held at Stockholm in 1996, the Yokohama Global Commitment, adopted at the Second World Congress against Commercial Sexual Exploitation of Children, held at Yokohama, Japan, in 2001, and the Report of the Independent Expert for the United Nations Study on Violence Against Children, in 2006 (see Pinheiro, 2006). Although the United Nations (UN) Convention on the Rights of the Child, 1989, forms the international basis for ensuring the rights and protection of children, it never envisaged the phenomenal contributions of ICT to the problem.

The ICT dimensions of the sexual exploitation of children have exacerbated the problem, and the UN, through its agencies, has been the arrowhead of the campaign against this odious problem. The UN Commission on Crime Prevention and Criminal Justice (CCPCJ), an ancillary body of the UN Economic and Social Council (ECOSOC) and the governing body of the UN Office on Drugs and Crime (UNODC), established in 1992, undertakes international action to combat national and transnational crime, promoting the role of criminal law to prevent illegal trafficking in natural resources, crime prevention in urban areas, and improving the efficiency and fairness of criminal justice administration systems (UNODC,

2014). While the CCPCJ did not have the issue of cyber-obscenity and sexual exploitation of children via cyberspace as part of its original mandate, the CCPCJ has adopted a proactive approach in responding to this global menace. The critical areas of strategic responses mapped out under the auspices of the CCPCJ are: research, prevention, punishment, and cooperation (see UN ECOSOC, 2011; CCPCJ, 2007: 67; CCPCJ, 2011).

At the regional level, the European Union (EU)'s Parliament and Council of Europe (CoE)'s Directive on Combating the Sexual Abuse and Sexual Exploitation of Children and Child Pornography, adopted in 2011, obliges Member States to provide for criminal penalties in their national legislation in the form of "effective, proportionate and dissuasive" penalties for the online solicitation of children for sexual purposes. Beyond prescribing stiffer penalties for sexual abuse of children; sexual exploitation of children; child pornography; and 'grooming', the EU Directive effectively responds to the peculiar challenges arising out of internet revolution that made child pornography widely available. Prevention and protection of victims are among its main objectives. In addition, member states may block access to such web pages, but must follow transparent procedures and provide safeguards if they make use of this possibility. The Directive further set a two-year time frame within which member states are to transpose its contents into national legislation (Europa, 2014).

It must be mentioned that despite the conscientious legislative responses from the EU and the CoE, seen through the CoE Convention on the Protection of Children against Sexual Exploitation and Sexual Abuse (the Lanzarote Convention), 2007, which introduced the offence of "knowingly obtaining access, through information and communication technologies, to child pornography" (CETS No. 201, article 20(1)), the radical approach of the 2011 Directive, in conjunction with the corresponding offences in a number of national jurisdictions, prosecutions have been very uncommon across Europe (European Cybercrime Centre, 2013).

With leadership provided by the US, several countries of North America, Central America and South America have sought to address the menace of online exploitation of children through the adoption of severe laws. Many of these laws provide severe penalties for producers and distributors in most countries, usually including imprisonment, with shorter duration of sentences for non-commercial distribution depending on the extent and content of the material distributed (Aknediz, 2008).

It is becoming apparent that all countries and supranational organisations that are waging the war against cyber-based sexual exploitation of children are doing so largely along the same path of creating and strengthening legal regime of arrest, prosecution and punishment. The lingering question in the absence of tangible breakthroughs is whether this battle should not be waged along the conventional criminal justice system paths as with a blend of other strategies, including statutory measures on service providers, filtering technologies and self-regulation. If, as several empirical studies have shown, countries with the capacity and wherewithal to curb the menace of cyber-based sexual exploitation of children are struggling to exert totally effective grip on the problem (Crosson-Tower, 2005; Wells *et al.* 2007; Mathew, 2009), should African response not move beyond the purview of existing measures to conceptualise the problem more as a developmental challenge in order to involve the very people who are the direct victims and bearers of its consequences?

5. Africa and the Future of Cyber-based Sexual Exploitation of Children

Data on the extent of child pornography, cyber-obscenity and online sexual exploitation of children in Africa are not readily available. The number of reported cases is unknown, because data on sexual offences are not disaggregated even in countries where databases of sexual offences exist. Few prosecutions are instituted, and information about them often needs to be obtained from newspapers and non-verifiable reports. Nevertheless, several cases have highlighted how new technologies may be used to compound harm. In South Africa, a Kimberley photographer was charged with child pornography offences after posting naked images of his former girlfriend online after she broke up with him (see "Photographer charged with rape, child porn", News24, 3 June 2014). It had earlier been reported that online child pornography was on the increase in South Africa (see "Cellphone child porn on rise", IOL News, 14 May 2008). The consequences for the victims were devastating and their humiliation is compounded by the awareness that the images had reached an extensive audience and will continue to do so long into the future.

Compounding the gravity of the African context of the menace is the variegated responses by African governments. A global survey carried out by the US-based International Centre for Missing & Exploited Children (ICMEC) in 2006 found that while only South Africa had a serious legislative framework against this problem in Africa, six countries had inadequate laws, and yet, 34 others had no laws on the problem at all (ICMEC, 2006).

This legal vacuum creates a dangerous gap that exposes children to the risk of abuse, further increased by the impunity factor. The intricacy of the Internet means the solutions will be as equally multifaceted. All African countries should ensure ratification and implementation of all existing treaties related to protection of children from sexual exploitation to demonstrate their commitment to prevent and sanction child exploitation and the use of ICT to facilitate it. The laws of all African countries should be harmonised with the provisions of the ratified international instruments. The highest international standards should be applied and include best practices developed globally (such as the CoE Convention on the Protection of Children and the Cybercrime Convention) that lead, for example, to the criminalisation of ‘grooming’ through ICTs and the use of ICTs for the perpetration of sexual exploitation of children.

It is in this regard regrettable that South Africa is the first and only African country to join the Luxemburg-based International Association of Internet Hotlines (INHOPE), a global umbrella body of internet hotlines fighting against sexual exploitation of children. INHOPE reports inconsistencies within its member states on the extent to which Internet hotlines can access and therefore properly assess child abusive materials. In member states where law enforcement agencies are empowered to access child abusive materials without fear of liability, the hotlines can provide a comprehensive intelligence package which not only saves law enforcement time by providing more accurate information, but also helps them prioritise (European Cybercrime Centre, 2013). It will be to the advantage of African states to subscribe to such a mechanism.

Going forward, African governments should pass legislation that imposes the following minimum obligations upon ISPs: (a) to delete contents showing child pornography upon request; (b) to report – within a definite term – to law-enforcement agencies any instances of sexual exploitation of children drawn to their attention; and (c) to safeguard evidence if they suspect a sexual exploitation of children offence has been committed through their service. The African Union (AU) must also exert its influence to establish forums for the development of regional legal instruments (or at the very least policies), such as for the regulation of ICT service providers to report instances of all forms of online sexual exploitation of children.

Beyond the established strategies of strengthened criminalisation, tracking and filtering, however, African states, in collaboration with civil society organisations (CSOs) should focus on child-centred strategies that enhance the young person’s resilience. In this way, the platform should be created for building the young person’s self-esteem, attempting to help them to take control of their circumstances and to build confidence in their capacity to cope. While the dominant perception of sexually exploited children is important, it can undermine their capacity to be resilient (ECPAT International, 2009).

Young persons should be enabled to gain a fuller awareness of themselves and of the abuses that they are experiencing. If viewed in this way, young people can then be worked with as both victims of abuse and as active agents who can have some constructive control over their own destinies. The child or young person, and her or his parents/carers, should be made aware of the concerns, included in the plan and involved in all network meetings. However, engaging the child and family, and alerting them to the risks, needs to be approached with a high level of sensitivity to avoid estrangement. Rather than categorising children’s experiences into the categories of ‘risk’ and of ‘protection’ against our perceptions of risk, we might seek the seeds of personal and social transformation that lie even within adversity: work with and for children can seek holistically to prepare and assist them to thrive and develop through life’s difficulties as well as its rewards.

Another aspect of the work that needs to be undertaken includes the development of practice skills and knowledge among carers and community care workers caring for looked after children at risk of online sexual exploitation. It is not until online sexual exploitation is recognised and understood by the full range of services for children and young people that the envisaged multi-agency approach to supporting sexually exploited young people can be enacted.

6. Conclusions

The underpinning thrust of this paper has been that the strategies on combating the child sexual exploitation of children via the internet must move beyond the purview of law enforcement. A strong case has been made for giving children a voice in the processes against this nefarious phenomenon because at the core of the whole problem is their development. They must be first-line supporters of all control strategies and be made to understand the rationale behind these.

Far from being an *ex cathedra* pronouncement on all the dynamics that should inform strategies to curb online sexual exploitation of children, this paper would have served its purpose if it helps to advance some recondite considerations for different practitioners working in various capacities with young people and to support further development of appropriate services for sexually exploited young people.

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Fire Hazard Notifications via Satellite, Twitter, Citizen Reports, and Android Apps

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Abstract

Humanity has had a long historical relationship with fire. According to anthropologists, the first humanoid species learned to use and control fire approximately two million years ago. *Using* fire and *controlling* fire, however, are dramatically different operations. From prehistoric times, uncontrolled fire has brought death and destruction. In more recent historical times, the Roman Empire used slaves and conscripts to fight fires. Since slaves and conscripts did not have the same interest in preserving the empire as freemen, subsequent firefighting organisations in the Roman Empire used freemen instead of slaves. In even more recent history, many countries have a proud history of having a volunteer firefighting force. Regardless, however, of whether it is slaves, conscripts, freemen or volunteers who fight the fire, early detection of the fire is critical. In the presence of dry fuel, the right atmospheric conditions and a source of ignition, wildfires spread easily and quickly. This paper describes a project which combines satellite imagery with crowdsourced fire information collected from citizens and residents in order to provide a fire hazard notification system to participants.

Keywords

fire, hazard, mobile, android, citizen report, twitter

7. Introduction

People have had a long historical relationship with fire. According to anthropologists, *Homo erectus* was the first human species to use fire nearly two million years ago (Leakey, 2008, pp. xiv) and acquired the knowledge to start and stop fires (Pyne, 1998, pp. 64). In South Africa, Swartkrans cave shows some of the earliest evidence of fire being used by humanoids (Brain & Sillent, 1988; James, 1989).

Using fire and *controlling* fire, however, are different things. From prehistoric times, uncontrolled fire has brought death and destruction. In more recent documented historical times, accounts from the ancient Roman Empire describe community efforts to suppress uncontrolled fire in 24 B.C. when emperor Augustus Caesar created what was probably the first fire department which consisted of approximately 600 slaves and conscripts. Slaves and conscripts, however, often have no real personal interest in preserving the property of their owners and captors. In approximately 60 A.D., emperor Nero established a core of 7,000 freemen (and not slaves) who were responsible for fire prevention, firefighting, and building inspections (International Association of Fire Chiefs & National Fire Protection Association, 2008, pp. 10).

Many countries have a proud tradition of volunteer fire departments manned by the citizens in the area. In 1736, before he became one of the founding fathers of the United States, Benjamin Franklin established the first volunteer fire department in North America. According to historian Libby O'Connell, this volunteer fire department offered citizens "...an opportunity to improve their city and themselves". She explained that "You don't just look to the government; you have to look to your community to pitch in and help" (Cohen, 2012).

Fires grow rapidly if there is enough oxygen and fuel (in a condition suitable for burning). Certain atmospheric conditions such as low relative humidity and high wind exacerbate fire spread. Early detection is key to successfully controlling a

fire. Throughout history, the attempt to detect fires early, has led to many innovations – some more precarious than others as can be seen in Illustration 1 (Zimmerman, 1969, pp. 5).

This paper describes a fire hazard warning system which uses satellite imagery combined with crowdsourced citizen reports published on Twitter and published via a specific mobile phone app. The mobile phone app serves dual purpose of providing an easy channel in which to publish citizen reports of fires and to warn the people of nearby fire hazards.

8. Economic Impact of Uncontrolled Fires



Illustration 1: Lookout Tower, circa 1921

The Fire Protection Association of Southern Africa (FPASA) was established in 1973 and provides specialised fire related information and services to South African industry, commerce, and society at large. It publishes annual reports about fire statistics in South Africa (FPASA, 2013a).

In June, 2013, FPASA published the results of their extensive analysis of fire related incidents for the year 2011 (FPASA, 2013b) in which they categorise types of fires, fire brigade names (including municipalities), monetary values of loss, and lives lost. According to their report, in 2011, there were 37,721 related fire incidents in South Africa, in which 410 people lost their lives. Their calculation of Rand value damage was just over two billion Rand (R2,085,522,959) for the year of 2011.

Fire information systems in South Africa observe many thousands of wildfires each year, a significant number of which are threats to infrastructure (e.g. electricity transmission lines and transport corridors), human and animal life as well as vegetation and soil (McFerren & Frost, 2009).

From these statistics it is clear that if a citizen augmented early warning system could be successfully implemented, there could be a social benefit and business benefit to South Africa.

9. Architecture

The path of information between the various components can be seen in Illustration 2.

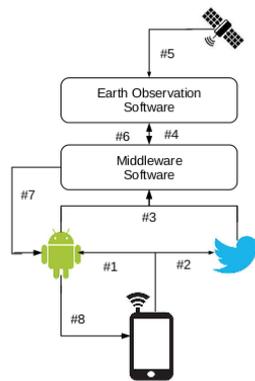


Illustration 2: Flow of Information

When a person with a cell phone observes a fire hazard, he or she can either use an Android application (#1) to publish this information or can publish the information on Twitter (#2). In either case, the middleware communication platform receives this information (#3) and forwards it to the Earth Observation platform (#4). Concurrently to this, the Earth Observation platform receives satellite images (#5).

The Android application can also be configured to send periodic location information about the user which is also forwarded to the Earth Observation platform using the same channels. When the Earth Observation platform determines that the Android user is in the vicinity of a fire hazard, a notification is sent to the user (#6, #7, #8).

Each of these steps will be discussed in their own sections.

10. The High Tower – Satellites

The application under discussion accesses fire information from the CSIR Advanced Fire Information System, as described by McFerren & Frost (2009).

Satellite imagery is obtained from computational processing chains over data received via direct broadcast from satellites carrying the NASA MODIS instrument as they pass over a receiving antenna. The processing chains extract geo-located active fire “hotspots” from raw imagery. A hotspot is a pixel that has a relative temperature to the surrounding pixels that exceeds a certain threshold. The algorithm is beyond the scope of this paper. These hotspots may be used as a proxy for fire detection. Each hotspot datum carries attribute information concerning detection time, intensity and geo-location.

Hotspot data are loaded into a geospatial database where they may be queried together with other data sources in order to generate information products and reports. Additionally, the hotspots are placed onto stream/event processing systems where they can be disseminated appropriately as part of early warning alerting systems or incorporated into external systems.

As useful as Earth Observation based systems have proven to be, they currently still suffer from a paradox: if you wish to see data at a high temporal frequency, you must sacrifice spatial resolution; if you want to see data at a high spatial resolution, temporal frequency is compromised. In practice, this means that you can observe large fires often and small fires if you are lucky and a satellite passes overhead at just the right time. To alleviate this paradox, alternative observation sources are required.

11. Android App

One of the purposes of applications on a mobile device is to make life more convenient for the user. The user has the internet to enable him or her to quickly search for a fact, a GPS to easily direct the user to specific locations, and other

other innovative facilities. With all this, perhaps a citizen could give back to the big world of data by providing important information - especially if it is one button tap.

When driving along the road, a vehicle can easily get stuck in traffic. Traffic can be caused by many things such as accidents, spilled goods, and various other hazards. For this project we looked specifically at one particular type of hazard - fire. There are not many services that report fires. If a driver saw a fire along the road, he or she would have to search the Internet for a phone number and then phone the local fire departments to report it. This is difficult while driving (if not, actually, illegal). Fires spread easily when there is the required fuel, oxygen, and atmospheric conditions. Fire can get close to roads which is dangerous. The smoke from the fires alone can impair the vision of drivers.

One of the main problems is that fire hazards are not easy to report. The mobile application developed for this project enables easy reporting of fire hazards. Once the application has been downloaded and installed, all that is necessary is to sign into Twitter to post tweets about fire hazards that have been spotted. This requires that the GPS is enabled because the location of the hazard needs to be sent out.

An even more important feature is the facility that the application offers to alert the user as can be seen in Illustration 3. There is no need to sign into any social media platform to be able to receive alerts. The application periodically sends the user's GPS coordinates to the Earth Observation platform. If the user is approaching a hazard, a notification will be sent to that user. The user will see the notification in their notification bar. Once tapped, the user will have a text based hazard description, as well as a map view. The map will have both the user's current location and the location of the hazard. This makes it easy for viewing purposes if the user happens to be in slow moving traffic. They could easily see where the hazard is on the map and possibly avoid it by taking an alternate route.

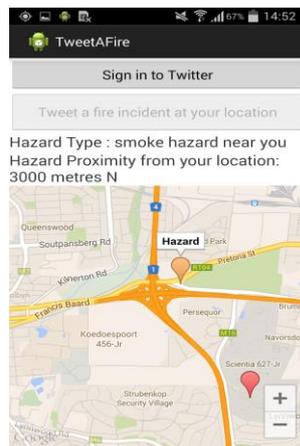


Illustration 3: Sample alert

12. Crowdsourcing

Jeff Howe is attributed with coining the term *crowdsourcing* in his article in Wired Magazine in 2006 (Howe, 2006). The definition of *crowdsourcing* varies but the definition normally has four components (Alsever, 2007). 1) A group of people 2) provides information 3) usually free of charge 4) to another group of people. Websites such as Wikipedia and Youtube are examples of crowdsourcing.

Obviously, the Internet makes crowdsourcing easy. But in some industries, crowdsourcing has been available for as long as some form of communication is available. In the aviation industry, PIREPS are weather reports provided by pilots in-flight. These are especially important if the weather encountered by the pilot differs from the predictions published by the weather bureaus (Federal Aviation Administration & United States. National Weather Service, 2010).

In this project, crowdsourced data about fires are extracted from two sources. One source is Twitter. Twitter is a micro-blogging website where users can publish 140-character status updates or *tweets* (Kwak, Lee, Park, & Moon, 2010). People tweet about what they see, what they hear, what they experience, what they feel, and what they believe. The second source of data is from a specialised mobile phone app for Android which provides easy posting of a fire hazard with the press of one button. Each of these data sources will be described below.

13. Twitter, Microtext and the μ Model

Twitter is a micro-blogging site where users publish short 140-character status updates (Kwak et al., 2010). Twitter provides a number of APIs which provide functionality for searching and extracting these status updates. It is possible to search by a combination of strings (such as *veldfire*, *shackfire*, etc), by hashtags (such as *#grassfire*), and by geo-locations (longitude and latitude of locations with a surrounding radius). Twitter provides these searches both synchronously and asynchronously. Currently, at the time of writing this paper, searches for the last 24 hours are free of charge.

Because of the length restriction on posts on Twitter, people resort to using Microtext. According to Ellen (2011), microtext messages are:

1. Very brief perhaps consisting of just a single word or symbol
2. Generally informal and unstructured
3. Has a “minute level” timestamp and an author

Other examples of microtext (besides Twitter) include SMS (Short Message System) and instant messaging.

The μ Model (pronounced “mu” and representing the phrase “microtext understander”) is a model for spotting predefined topics in microtext and has been used in applications to spot topics in mathematics (Butgereit, 2012) and to spot topics about the weather (Butgereit, 2014). The model consists of four steps: 1) removal of stop words 2) stemming 3) spelling correction and, finally, 4) topic determination.

A sample tweet can be used to demonstrate this model: [#shackFire](#) four shacks up in flames

Stop words are words which can be safely removed from a sentence without changing its fundamental meaning. This operation would transform the post to simply: [#shackFire](#) shacks flames

Stemming removes suffixes from the ends of words. This would ensure that words such as *burns*, *burn*, and *burning* would equate to the same root word. This operation would transform the post to: [#shackFire](#) shack flame

In this particular example, all of the words are spelled correctly and no transformation is required. The last step is to compare the remaining words to vocabulary lists to determine the topic.

In this particular project, Twitter was polled every 10 minutes for appropriate tweets around South Africa. Tweets which were deemed by the Middleware to be appropriate, were forwarded to the Earth Observation platform along with any geo-location.

14. Hazard Notification Generation

In order to generate a hazard notification two components are required. First the identification of a potential hazard, such as a veld fire. Second the identification of an entity either a human or some infrastructure that may be placed at risk as a result of that hazard. For instance a car moving along a road that has a veld fire burning next to it.

The hazard and the entity at risk have location and as such these locations may be tested for future intersection. A naïve yet effective test is to place a large bounding area around the hazard and test for any entities that are within this bounding area. Once an intersection has been identified a message is generated and passed to messaging middleware which then forwards it to the appropriate users running the Android application.

15. Evaluation

Although the evaluation of the technical aspects of the architecture and communication channels is important, of more importance is the evaluation of the human aspects of this project and the way it relates to cybercitizenship.

A number of human issues have arisen which have been detrimental to the evaluation of this project. There are two primary issues.

The first issue is that people do not appear to tweet about fires in their vicinity. This was unexpected. Previous research had shown that people tweet often about the weather (Butgereit, 2014). This phenomenon of tweeting about the weather mirrors the normal human activity of talking about the weather (Harley, 2003; Strauss & Orlove, 2003). The authors had assumed that there would be more activity on Twitter about veldfires, shackfires, and forestfires. Unfortunately, this did not turn out to be true. While there are tweets about fires, in most cases those tweets are generated by news organisations or safety organisations. They were rarely generated by individual people. A superficial search at Twitter confirms this fact in other countries which are prone to wild fires including the United States and Australia.

The second issue concerned the use of the GPS on the mobile phone. Very few of the tweets which were extracted contained geo-location information about the sender. The software had to interpret the location from the textual portion of the tweet instead of receiving exact longitudes and latitudes. That means that tweets such as: "Huge veldfire rages out of control near Vaalwater."

could not be precisely located on a map since there is no longitude and latitude and the expression "near Vaalwater" is very broad.

Another issue with the GPS concerned using the GPS with the Android app to receive hazard notifications. In order to receive notifications timeously, the participants needed to have the GPS enabled along with the Android app running in order to have his or her location updated timeously on the Earth Observation servers. This severely drained the cell phone battery.

16. Conclusion

Humanity has had a long history of interacting with fire. Throughout history, people have attempted to have fire warning systems and firefighting systems. In the Roman Empire, slaves and conscripts had been used as firefighters even though the slaves and conscripts had no real personal interest in protecting the Empire's assets. In later development, freemen were used as firefighters in the belief that freemen had more vested interests in the surrounding areas. In more recent times, many areas have developed volunteer firefighting departments.

This paper explores the possibility of crowdsourcing citizen reports about fires using both Twitter and a mobile Android application. This information was then merged with satellite images. The satellite images could be used to locate large fires and the crowdsourced citizen reports could be used to locate small fires before they grew into large fires. Users who were running the Android application could then receive timeous notifications when there was a fire hazard in their vicinity.

Although the architecture and framework were successfully implemented, there existed certain human characteristics and cell phone characteristics that impeded the success of this project. The primary human characteristic which impeded this project was the fact that very few people actually posted tweets about fires. This is true around the world and is not just a South African characteristic. The primary cell phone characteristic which impeded this project was the fact that keeping the GPS enabled on a cell phone (in order to either report fire hazards or to receive fire hazard notifications) drained the battery unacceptably.

In conclusion, although the technology implementation was successful, the actual project implementation was less successful due to human nature (people do not talk about fires as commonly as they talk about the weather) and due to GPS facilities draining cell phone batteries. The researchers, however, are confident that if a media campaign to encourage people to tweet about fires were undertaken, the first problem could be ameliorated. In addition, as cell phone battery technology advances, the researchers are confident that more and more people will keep their GPS enabled thereby ameliorating the second problem.

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What is a Smart City for information systems research in Africa? Review protocol and initial results

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Abstract

The concept of a “Smart City” has been approached from different perspectives by researchers from different fields in recent years. In the process, various characteristics of “smartness” have been proposed and explored. While there are elements in common, the different ways of understanding the term “Smart City” reveal different assumptions about cities and their inhabitants, contextual differences, as well as disciplinary biases. There is the danger that the loose use of the term might create misunderstandings and dissent.

This paper sets out a protocol for a systematic review of research into information systems for Smart Cities. We report initial findings of the review, analyse the ways in which a Smart City is defined by information systems researchers and investigate the possibility of a consensus definition. We also interrogate the smart city efforts of five African cities (Cairo, Cape Town, Johannesburg, Lagos and Nairobi) to understand the relevance of the definitions used by researchers to practitioners.

Keywords

Smart City; Intelligent City; Systematic Literature Review; Information System; Information Service; Africa

19 Introduction

The concept of the smart city is employed as an umbrella term for a range of technological, governance, management and ecological concerns about urban living. The characteristics of a “smart city” are often enumerated by researchers who identify governance, transportation, economic activity, people, and the natural and built environments amongst the targets for city “smartness” (Giffinger et al., 2007, Yigitcanlar et al., 2008, Chourabi et al., 2012, Caragliu et al., 2011, Neirotti et al., 2014).

Smart cities have also been defined in terms of the “performance” of the city (Giffinger et al., 2007) where smart city outcomes include sustainable economic growth and a high quality of life (Caragliu, Del Bo, & Nijkamp, 2011). Many definitions recognize people as a central component of urban life (for example Chourabi et al., 2012; Giffinger et al., 2007; Neirotti et al., 2014). Although for some the focus is on the needs and preferences of elite knowledge workers (Yigitcanlar et al., 2008), others are concerned with all the people in the urban environment and how they can take advantage of the benefits of smart living (Caragliu et al., 2011; Odendaal, 2003) and overcome problems of digital divides (Partridge, 2004).

A common thread that cuts across various definitions is an expectation that information and communication technologies (ICT) play a significant enabling role in the creation of smart cities. Some researchers however considers ICT’s role narrowly by defining a smart city in terms of sensors and networks (Washburn et al., 2010; Roche and Rajabifard, 2012) and where the role of ICT is to provide for what might be termed “digitally connected living” where citizens have access to the necessary applications, hardware devices, network infrastructure, and the e-skills to use information resources. Others are focused on the extent to which city services are being automated, informed or transformed through the use of technology (Lee and Lee, 2014), with current efforts largely pointing to a role for ICT in providing for “informed living” – the state where information systems facilitate both the use of information to support decisions and actions in people’s daily lives and the generation of information as a consequence of those decisions and actions (Giffinger et al., 2007; Velosa and Tratz-Ryan, 2013). Given all the varying conceptualizations of the smart city, the question arises as to whether it is possible to arrive at a consensus definition of a “Smart City” that can inform information systems research into the development of Smart Cities in the African context?

We contribute to answering this question, by examining how information systems researchers understand smart cities, and how these conceptions relate to the approaches being taken by city governments in Africa to make their cities smarter. We present preliminary results of a systematic review of definitions of Smart Cities used in IS research, and consider how the literature-based conceptions of Smart Cities are reflected in smart city efforts underway in five African cities (Cairo, Cape

Town, Johannesburg, Lagos and Nairobi). The paper concludes with our reflections on the results obtained thus far and a discussion of our future research.

20 Systematic Review Protocol

To address our objective of identifying a definition of Smart Cities to guide research into the role of information systems in Smart Cities, we carried out a systematic literature review, in a manner similar to other systematic literature reviews in the software engineering space (Kitchenham *et al.*, 2009; Gutierrez *et al.*, 2013).

The research questions that the review addresses are:

- 1) For researchers in information systems, what is a Smart City?
- 2) Is it possible to identify a consensus definition of a Smart City for information systems research?
- 3) How do the definitions in use relate to the nature of the research being undertaken?

Search strategy

A challenge in conducting the review was the cross-disciplinary nature of Smart City research. Even though our interest was in definitions appropriate to information systems research, working with the literature within a specific discipline (such as information systems) would have excluded a wide range of relevant research. For this reason we made use of databases that cover multiple disciplines to source articles, as well as those specific to information systems. The databases selected were Scopus, Science Direct, ACM Digital Library, AIS Electronic Library, Africa Portal, and Sabinet.

The search terms for the study were based on the research questions. We searched for “smart city” and “information system”. We restricted the search to articles in peer-reviewed scholarly journals, transactions or conference proceedings on the assumption that peer-review would ensure a level of quality. We included conference papers and transactions because of the newness of the field.

Inclusion and exclusion criteria

An initial search of Scopus revealed that in the years 1995 to 2007 there were only five papers published that used the term “Smart City” and at most one paper in any given year. We therefore searched only on articles published from January 2009 to May 2014 (inclusive). Papers were included for review only if they were peer-reviewed and written in English, addressed the theme of how information systems (broadly interpreted) contribute to the development of Smart Cities and were accessible via the university’s library holdings.

Papers were excluded if they reported duplicate results from another paper, if information systems were peripheral to the study, if the concept of a smart city was peripheral to the study, or if the research was carried out in rural rather than urban contexts.

Data collection

The searches were performed between the 16th May 2014 and 28th May 2014. For each paper included in the study, the following information was recorded in a spreadsheet:

- Author(s) and Year of publication
- Title and Journal details
- Abstract
- Any explicit Smart Cities definition
- Any implicit Smart Cities definition and the text to support that interpretation

Our process resulted in 90 papers being identified for title and abstract review. The abstracts were reviewed by the two authors individually for inclusion according to our criteria. Discrepancies were discussed and agreed on. Sixty papers met our inclusion criteria.

21 Initial Analysis and Results

The analysis presented here was carried out on the first 30 of the identified papers, limited only by time constraints. A complete analysis is still under way and will be reported in due course. Information about the papers is summarized in Table 2.

Table 2: Summary of Included Papers (n=30)

	Number	Percentage
Year of Publication		
2009	1	3.3%
2010	2	6.6%
2011	2	6.6%
2012	6	20%
2013	11	36.6%
2014	8	26.6%
Publication Type		
Conference Proceedings	11	36.6%
Journals	18	60%
Book Chapters	1	3.3%
Focus of Paper		
Smart city technologies	21	70%
Smart city services	9	30%

Definitions in use

Once the abstract review was complete, each included paper was read in detail by one of the co-authors to identify whether the paper included an explicit definition or conceptualization of the idea of Smart City. Where there was no explicit definition we looked for a definition implied by how the term was being used or referred to. Seventeen papers had explicit definitions, of which seven were the author's own definitions and ten were references to other researcher's definitions. In a further ten papers we could identify implied definitions. In three papers we could find no definition and could not identify an implied definition.

The ten papers that cited definitions took them from varied sources. The following authors' definitions were cited: Cook and Das (2005), Nam and Pardo (2011), Komninou *et al.* (2011), Sharma *et al.* (2010), Washburn *et al.* (2010), Giffinger *et al.* (2007), Toppeta (2010), Chourabi *et al.* (2012), Caragliu *et al.* (2009). Each was cited by one of the papers with the exception of Giffinger *et al.* (2007) which was cited in two of the papers. In addition there were references to Smart Spaces based on definitions by Kallmann and Thalmann (1998) and Kortuem *et al.* (2010) as well as the Ubiquitous City or "U-city" which is apparently defined by legislation in Korea (Shin *et al.*, 2012).

We classified explicit and implicit definitions according to whether they were focused on technology (T) or services (S). That is definitions of smart cities that prioritized the role of technology in smart cities were coded T, while those that prioritized the provision of services by the city, with technology playing a facilitating role (if any) were coded S. We then examined the extent to which the definition was narrow (N) or broad (B). A technology focused definition was coded as N if it referred to the provision of or demand for a single technology and B if it referred to the provision of, or demand for multiple technologies. Service-oriented definitions were coded as N if they referred to the provision of, or demand for a single service and as B if they referred to the provision of or demand for multiple services.

Of the 27 explicit and implied definitions, 17 had a service focus and 10 had a technology focus, while 19 were classified as broad and 8 as narrow. This means that information systems researchers tend to understand smart cities as being about the provision of a broad range of services. Figure 1 summarizes the varying definitions of smart cities in Information Systems research with examples.

Figure 1: Examples of Smart City definitions in use in IS research

T/B (n = 5)	S/B (n = 14)
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Broad	“a connected community that combines broadband communications infrastructure” (Al-hader <i>et al.</i> , 2009)	“a metropolitan area can be classified as smart when safety, enhanced public services, healthcare monitoring, green sustainability, intense social interaction, and efficient transportation systems become available to any citizen wherever he is located.” (Piro <i>et al.</i> , 2014)
Narrow	T/N (n = 5) “Smart City is a program focused on modernization and reconstruction of existing engineering networks, to create a common information space of the territory.” (Duravkin, 2010)	S/N (n = 3) “provide opportunities to transform the relationship between government and citizens in a new way” (Ghatak and Singh, 2010)

Technology Focus

Service Focus

Relationship between research and definitions

In order to compare the definitions with the nature of the research being carried out, we also classified the research being done in each paper according to whether it was technology or service focused and whether it took a broad or narrow perspective. Thus we classified a paper as technology-focused (T) if it investigated the consumption or delivery of a technology or technologies and service-focused (S) if it investigated the consumption or delivery of a service or services. We then examined the extent to which the research being undertaken was narrow (N) or broad (B). A technology focused paper was coded as N if it researched the provision of or demand for a single technology and B if it researched the provision of, or demand for multiple technologies. Service-focused papers were coded as N if they researched the provision of, or demand for a single service and as B if they researched the provision of or demand for multiple services.

Of the 30 papers, 9 had a services focus and 21 were technology-focused while 15 were classified as narrow and 15 were classified as broad. This means that despite the information systems researchers making use of definitions of smart cities that are service oriented and broad, the majority of research being carried out is focused on technologies, rather than services.

Thirteen of the papers were doing research that was consistent with the definition in use. Five papers were reporting broad, services-focused research and making use of a broad, services-oriented definition of smart cities. Four papers were reporting narrow, technology-focused research and making use of a narrow, technology-oriented definition.

Fourteen of the papers were doing research that was inconsistent with the definition in use. Of these, six papers were reporting broad, technology-focused research, while making use of a broad, services-oriented definition for smart cities. A typical example of this would be the paper by Piro et al. (2014) which discusses the technology and network architectures required to make a smart city viable, while defining a city as smart when “when safety, enhanced public services, healthcare monitoring, green sustainability, intense social interaction, and efficient transportation systems become available to any citizen.”

Thus far we have encountered only one paper that has a narrow, technology focus while making use of a broad, service-oriented definition of smart cities. The Poulton and Roussos (2013) paper examines modelling and simulation tools used by the London ambulance service (a narrow, technology focus) while implying that city smartness relates to using ubiquitous technologies to react to human dynamics in the city in providing for human needs (a broad, service orientation).

The broad service definitions view the smart city as one that enhances quality of life by informing (in the sense of Zuboff, 1988) the city’s services i.e. providing residents with an *informed living* experience (Lee and Lee, 2014). The technology focused definitions reflect *digitally connecting living* as the foundation of the city where a networked infrastructure provides a platform for city residents to enjoy anytime anyplace access.

22 Smart City Plans of African Cities

To determine whether the above smart city conceptions relate to the approaches being taken in Africa, we examined the smart city plans of five African cities. These cities were selected based on their being large (by population), having a GDP per capita of at least US\$1500, and on relevant information being uncovered during our desk-top research.

Johannesburg (pragmatic; the definition is academic)

The City of Johannesburg has adopted Caragliu et al.'s (2011) definition for a smart city as one where “investments in human and social capital, and traditional (transport) and modern (ICT) communication infrastructure, fuel sustainable economic development and a high quality of life, co-exists with the management of natural resources, through participatory action and engagement”. In operationalising this, the city has projects underway to address digitally connected living as the prerequisite to informed living.

Cape Town (strong on service)

The City of Cape Town's Integrated Development Plan⁸ makes no explicit reference to a Smart City but speaks to a service orientation focused both on transforming the way that local government works and delivers its services, and the way the entire society operates. The plan references the Opportunity City (economic development and mobility), the Safe City (crime prevention and management), the Caring City (housing and healthcare), the Inclusive City (service management and community facilities) and the Well-Run City (transparency and administrative efficiency).

Lagos (any definition will do)

At the other extreme, Lagos has been described as a “self-service city” (Gandy, 2006) where the residents have largely given up any expectation of services being provided by the city management. Instead, residents are defining a smart city for themselves through entrepreneurial networks to provide everything from water to technology hubs. Lagos participated in the IBM Smarter Cities Challenge from which emanated recommendations to use technology solutions to better manage traffic and co-ordinate emergency services in the city.⁹ The implied understanding of Lagos State Government's collaboration with the private sector to build Eko Atlantic city on the outskirts of Lagos, is that a Smart City is a “modern” spaces for business and leisure for the middle and upper classes and tourists. Here we find that, in the absence of government leadership in defining a smart city for the local context, international technology and construction providers step in to present their own technological definition, often at odds with the needs and preferences of the poorer sectors of society (Walker, 2014).

Cairo (competing definitions)

Cairo's Vision 2050¹⁰ defines a smart city as “global, green and connected” where city administration, housing, environment, transportation and water and sanitation are raised to an “international level”. A big concern for Cairo is overcrowding in the city centre and the plan focuses on how to move people out to the periphery of the city, and to support this initiative with transportation. There have been attempts to build “new cities” on the outskirts of Cairo, but they have not attracted residents. The “new cities” are clearly targeted at the middle and upper classes and tourists. Critics characterise Cairo as an “extreme case” of informal development. Visions of the upgraded “ring road” in the Vision 2050 document as a sleek high-speed highway, contrast sharply with anecdotes of how communities have worked to “break into” the ring road at multiple points by building illegal stairs and off-ramps. So while Cairo appears to have a stronger city government than Lagos, the espousal of definitions of smart cities that focus on “modern” facilities aligned to middle-class values appears to be fuelling resistance from residents who are working to create their own understanding of what the city might be.

Nairobi (crafting a local definition)

⁸ http://www.capetown.gov.za/en/IDP/Documents/IDP_final_for_setting_Council_Approved280512.pdf accessed 20 June 2014

⁹ <http://www-03.ibm.com/press/us/en/pressrelease/41296.wss> accessed 2nd June 2014

¹⁰ http://www.urbangateway.org/sites/default/ugfiles/8635_42944_AymanEl-hefnawi.pdf accessed 2nd June 2014

The Nairobi City County (NCC) is in the process of developing the Nairobi Integrated Urban Development Master Plan (NIUPLAN) for 2014 to 2030, with assistance from the Japan International Cooperation Agency (JICA)¹¹. Here the smart city is addressed through six “thematic groups”: (1) transportation, (2) governance and institutions, (3) environment, (4) land use and human settlements, (5) population, social systems and urban economy and (6) infrastructure. A draft master plan for the telecommunications sector¹² sets out the developments needed in telecommunications. Much of the plan is concerned with digitally connected living by improving ICT infrastructure. Thus Nairobi’s understanding of a Smart City as revealed in these documents varies from the very broad, service-orientation of the NIUPLAN, to a telecommunications sector document that supports digitally connected living. A contrasting technology focus is taken by the IBM Smarter Cities Challenge where Nairobi is advised that “new technologies and approaches are required to modernise the city’s systems and to make it a better place to live, work and do business” and where technology solutions for dealing with traffic congestion, power supply, emergency response and central record keeping are outlined.

Smart city perspectives in Africa

Past research has shown that the Smart City application domains that are pursued by cities depend on factors including the economic development, structural urban variables such as the geographical location, and population density (Neirotti et al., 2014). Our initial impressions are that, in Africa, where there are coordinated government efforts to identify an appropriate smart cities definition or to locally define what it means to be smart, we find a focus on the ICT infrastructure required to facilitate digitally connected living, followed by a focus on service provision. ICT infrastructure is seen as necessary to deliver services and to create equity of access for residents. Services that are identified as priorities relate to local conditions: disaster management in Nairobi, power and public safety in Johannesburg, transport and crime in Cape Town.

In the absence of city leadership to identify an appropriate definition or to locally-create one, private companies step in to present their own, supplier-driven definitions. These are more technology focussed and reflect the specialisms of the companies concerned. Such initiatives are allowed to flourish in some cities, with government support, but are less likely to be concerned with local needs and preferences and more likely to serve the interests of the elite (Walker, 2014).

Hollands (2008) makes the point that the “definitional impreciseness” of smart cities masks a range of assumptions about cities, their functions and the roles of people within them. Where cities espouse smart city definitions that are underpinned by economic growth or entrepreneurial discourses, cities “can become not only more economically polarized, but also socially, culturally and spatially divided by the growing contrast between incoming knowledge and creative workers, and the unskilled and IT illiterate sections of the local poorer population”.

23 Conclusion

How do IS researchers define smart cities and is it possible to identify a consensus definition? Our preliminary review (30 of 60 papers meeting our inclusion criteria) found that definitions adopted by IS researchers are largely focused on the smart city services that contribute to informed living. However, a consensus definition is not yet evident. Conceptualization of smart cities and further analysis of the definitions in the remaining 30 papers is ongoing. The lack of consensus in the academic literature is mirrored in city plans where we found definitions of smart cities varying from service- to technology-focus. Moreover, despite researchers adopting definitions focused on smart city services, empirical studies into adoption of smart city services, the benefits of informed living, and the challenges involved in implementation of smart city initiatives focused on informed living are few.

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¹¹ <http://citymasterplan.nairobi.go.ke/index.php/niuplan/background> accessed 4th June 2014

¹² [http://citymasterplan.nairobi.go.ke/docs/131008%20Telecom\(WGMeeting\).pdf](http://citymasterplan.nairobi.go.ke/docs/131008%20Telecom(WGMeeting).pdf) accessed 4th June 2014

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